



Proceedings  
the Second  
International  
Conference  
on

# STUDENT RESEARCH INTERNATIONAL CONFERENCE FOR YOUNG RESEARCHERS IN ECONOMICS AND BUSINESS 2023

(SR-ICYREB 2023)

Volume **1**



FINANCIAL PUBLISHING HOUSE

**PROCEEDINGS THE SECOND INTERNATIONAL CONFERENCE ON  
STUDENT RESEARCH – INTERNATIONAL  
CONFERENCE FOR YOUNG RESEARCHERS IN ECONOMICS AND BUSINESS 2023  
(SR-ICYREB 2023)**



**ACADEMY OF FINANCE (AOF), UNIVERSITY OF ECONOMICS - THE UNIVERSITY OF DANANG (DUE),  
NATIONAL ECONOMICS UNIVERSITY (NEU), THUONGMAI UNIVERSITY (TMU), BANKING ACADEMY OF VIETNAM (BAV),  
UNIVERSITY OF ECONOMICS & BUSINESS - VIETNAM NATIONAL UNIVERSITY (VNU-UEB),  
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UNIVERSITY OF ECONOMICS HO CHI MINH CITY (UEH), AND UNIVERSITY OF ECONOMICS AND LAW HO CHI MINH CITY (UEL)**

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## WELCOME NOTES

*Dear Friends and Colleagues,*

On behalf of the ten leading economic universities in Vietnam: *Academy of Finance (AOF)*, *University of Economics - The University of Danang (DUE)*, *National Economics University (NEU)*, *Thuongmai University (TMU)*, *Banking Academy of Vietnam (BAV)*, *University of Economics & Business – Vietnam National University (VNU-UEB)*, *Foreign Trade University (FTU)*, *Hue College of Economics – Hue University (HCE)*, *University of Economics Ho Chi Minh City (UEH)*, and *University of Economics and Law Ho Chi Minh City (UEL)*, we are delighted to extend our warmest greetings to all participants, students, and researchers attending this prestigious event. It is with immense pleasure that we come together to explore, discuss, and enrich our understanding of the dynamic fields of economics and business.

The International Conference for Young Researchers in Economics and Business 2023 (SR-ICYREB2023) is organized by the ten leading economic universities in Vietnam, and with the participation of students from these universities with the goal to create and develop an academic exchange environment with new ideas and research outcomes of students from economic and business universities. It also promotes experience exchange and enhances local and international coordination between students in scientific research to adapt to the new context.

The next few days are packed with engaging sessions, keynote speeches from renowned experts (Minh Tuan Bui - Tax Partner, Deloitte Vietnam and Aaron Saw, Head of Corporate Reporting Insights, ACCA), interactive workshops, and opportunities to connect with fellow enthusiasts. We encourage you to actively participate, share your thoughts, challenge assumptions, and contribute to the collective growth of knowledge in these vital disciplines.

We extend our heartfelt gratitude to all the organizers, sponsors, and speakers who have dedicated their time and efforts to this conference. Your contributions are invaluable to the success of this event.

Let's embark on this intellectual journey with open minds, ready to absorb new ideas and forge lasting connections. May this conference be a catalyst for inspiration, innovation, and collaboration that resonates far beyond its closing remarks.

Once again, a warm welcome to the International Conference for Young Researchers in Economics and Business 2023 (SR-ICYREB2023).

Best regards,

**On behalf of the Organizing Committee**

**Assoc. Prof. Dr. Co Trong Nguyen**

**People's teacher, President**

**Academy of Finance**



**ASSOCIATE PROFESSOR NGUYEN TRONG CO  
PEOPLE’S TEACHER, PRESIDENT OF THE ACADEMY OF FINANCE**



Assoc. Prof. Nguyen Trong Co is the President of the Academy of Finance. He has been working for the Academy of Finance since he was young and held different positions such as lecturer, Head of Financial Analysis Department, Deputy Head of Human Resources Department, and Vice President before being nominated the President of Academy of Finance in 2014.

He is the Editor of the Journal of Finance and Accounting Research and serves the Scientific Board of Finance Research Sector as Vice President and a member of *Scientific Board of Banking Research Sector*.

He was also nominated as honour member of FCPA Australia.

Assoc. Prof. Nguyen Trong Co is the author/coauthor of more than 21 valuable text books and supplementary materials such as “Financial Analysis”, Finance Publishing House, 2017, “Auditing management and usage of mineral resources for sustainable development in Viet Nam”, Finance Publishing House, 2016 and etc.

He has researched actively with more than 20 research projects spread on different fields: corporate finance and public finance, and technological markets. In the Academy of Finance, he has published more than 70 articles in both local and international journals.





## KEYNOTE SPEAKERS:

### **Keynote 1:**

**Minh Tuan Bui - Tax Partner, Deloitte Vietnam**

**Keynote topic: “BEPS 2.0 – Global Minimum Tax (Pillar 2) and Investment Attraction in Vietnam”**



Minh is Deloitte Private Leader with nearly 20 years of professional experience serving in tax and business advisory services. He holds Tax & Legal Leader position of Deloitte South East Asia in Industrial Products & Construction sector. In Vietnam, he is Leader of Korean Service Group, Tax Leader of Deloitte Private market segment; Global Investment and Innovation Incentives (GI3) Lead Partner. Minh brings a wealth of accumulated knowledge and expertise in various areas of global taxation and in Vietnam to provide his clients with prominence in strategic tax advisory, particularly in strategic tax advice to Vietnamese and international corporations operating in Vietnam; tax due diligence; corporate tax system health check; and tax controversy. With broad experience, Minh has a proven track record of successfully helping corporate clients access the financial reporting of complex tax positions as well as assisting them in negotiating with all levels of tax, customs authorities to obtain currency and certainty.

Minh has contributed significantly to the development of Vietnamese taxation system through his public speeches, quality articles, and interviews, and providing comments on draft tax laws and regulations.

Minh has been recognized as Vietnam’s Tax Controversy Leader by the International Tax Review for four consecutive years (2016-2019).



**Keynote 2:**

**Arron Saw, Head of Corporate Reporting Insights**

**Keynote topic: “Reporting of R&D: Disclosure without recognitions?”**



Aaron drives corporate reporting-related research activities and policies within the Policy and Insights team at ACCA to deliver high quality, professional and innovative inputs on key issues in the global corporate reporting agenda. Aaron believes in sharing knowledge widely. He focuses on making practical and relevant propositions to professional accountants and their organisations on improving the quality of financial and sustainability reporting.

His areas of interest include financial and sustainability reporting, business resilience, digital technology, and improving audit quality. He has designed the framework for a community that supports the professional development of SMPs – the SMP100.

Prior to this role, Aaron was the head of policy and technical for ACCA Maritime Southeast Asia (comprising Malaysia, Brunei, Indonesia, and the Philippines). He also had a decade of experience in a Big Four accounting firm in Malaysia where he was involved in providing audit and assurance services to multinationals and small and medium-sized enterprises operating in a wide range of industries, as well as technical consultancy, developing training programmes and conducting trainings.

Aaron has a Bachelor of Commerce (Honours) Accounting. He is a fellow of ACCA and a member of the Malaysian Institute of Accountants.



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## **STUDENT RESEARCH - INTERNATIONAL CONFERENCE FOR YOUNG RESEARCHERS IN ECONOMIC AND BUSINESS 2023 (SR-ICYREB2023)**

The Fourth Industrial Revolution (Industry 4.0) is the era of everything being connected to the Internet, marked by disruptive technologies in digitalization, virtual reality, artificial intelligence, and more. As soon as this revolution formed, it had a significant impact on the social lives of humans, gradually permeating every corner of existence. It replaces all manual labor in factories, workshops, and production lines. Any repetitive tasks, no matter how skilled, can be replaced by machines. Therefore, a high-quality workforce is an essential factor for the development of a nation, enabling the exploitation of other resources, leveraging strengths, and enhancing competitiveness in the global market.

At the same time, the Industry 4.0 demands that universities transition from traditional teaching and scientific research models to enterprise-oriented university models to fulfill three main tasks: education, scientific research, and community service. Vietnam is immersing into the regional and global economies as well as the trend of globalization, Vietnamese students and economic students in particular, are facing competitive pressures in both domestic and international labor markets.

Currently, the revised Higher Education Law provides an important legal basis to promote the implementation of autonomous universities, efficient utilization of resources, improvement of higher education quality, ensuring international integration, and better meeting the demand for human resources training in the socialist market-oriented economy and contributing to the socio-economic development of the country.

Hence, in order to reach beyond the boundaries of a nation or region and find one's place, Vietnamese students need to become global citizens, capable of meeting all recruitment needs and adapting to life and work anywhere in the world. Scientific research plays a role in equipping students with knowledge, skills, and scientific methods for learning and research. Engaging in scientific research helps students accumulate experience in report writing, information collection, and other skills needed to meet social demands.

Within the framework of the comprehensive cooperation agreement among universities in the economics and business sector, the Academy of Finance has collaborated with various universities including the University of Economics - The University of Da Nang, University of Economics Ho Chi Minh City, University of Economics and Law Ho Chi Minh City, Thuongmai University, Banking Academy of Vietnam, National Economics University, Hue College of Economics – Hue University, University of Economics - Vietnam National University Hanoi, and Foreign Trade University to jointly organize the international conference “Student Research International Conference for Young Researchers in Economics and Business (SR-ICYREB2023)”. The goal of the SR-ICYREB2023 is to establish and develop an environment for academic exchange, new ideas, and scientific research results of students from various universities in the economics and business. Sharing experiences and enhancing collaboration in management and scientific research activities among students are intended to promote the scientific research endeavors of students from these universities in the new context.

The articles and presentations at the SR-ICYREB2023 hold value not only from a theoretical perspective but also from a practical standpoint. In this conference, the Organizing Committee received more than 300 submissions from student authors and selected 235 papers for publication in the proceedings. The content of these published articles focuses on key issues such as economics, finance, accounting, business administration, socio-economic development, etc... he conference will serve as a platform for students from various economic and business universities to exchange ideas, provide academic opinions, share research experiences, analyze current situations, forecast contemporary issues, and discuss opportunities and challenges for the upcoming phase of socio-economic development.

#### **CONFERENCE ORGANIZING COMMITTEE**

**Part 1**  
**Finance and Banking**



## THE IMPACT OF AIR POLLUTION ON CASH HOLDINGS OF LISTED COMPANIES IN VIETNAM: THE MODERATING EFFECT OF FINANCIAL LEVERAGE

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**ABSTRACT:** *This study explores the relationship between air pollution and cash holdings in Vietnam, a bank-dominated economy. We examine a sample of 385 non-financial listed firms between 2016 and 2021. We document a non-significant association between air pollution and cash holdings. This might imply that a lack of strict regulations and inadequate enforcement, coupled with a general disregard for environmental concerns among the Vietnamese population, could lead to an insignificant link between cash holdings and air pollution. Additionally, we investigate the impact of the Covid-19 outbreak on the link between air pollution and cash holdings. Despite the pandemic's substantial global impact on various business aspects, our results suggest that it does not significantly affect the relationship between air pollution and cash holdings. Finally, we extend the literature by showing that debt can moderate the relationship between cash holdings and air pollution. Our results suggest that highly indebted firms may be less inclined to invest in environmental protection activities, resulting in a negative correlation between air pollution and cash holdings. These findings provide evidence supporting the idea that debt may emerge as a factor that reduces the need for firms to engage in environmental protection efforts.*

**Keywords:** *Air pollution, cash holdings, financial leverage.*

### 1. INTRODUCTION

The issue of air pollution has been significant for the entire world. Firstly, substantial air pollution has a negative impact on the mental and physical health of dwellers. Exposure to small particles endangers health conditions and increases the risk of contracting a variety of ailments (M. Franklin, Zeka, Schwartz, & epidemiology, 2007). Interestingly, Dong et al. (2021) claim that air pollution has a significant effect on analysts' moods and is conducive to bad decisions of managers. Secondly, air pollution limits corporate growth by decreasing market value, debt capacity, stock returns, and other resources (Levy & Yagil, 2011; B. Li, He, Gao, & Zeng, 2021).

In response to air pollution, a number of environmental protection measures, including rules to restrict businesses' ability to operate, have been released. Firms are also subject to societal disapproval if they fail to address environmental concerns. Therefore, businesses are more likely to facilitate investments enabling firms to act in line with stricter environmental requirements (Farrell et al., 2016; Zhao & Sun, 2016). In general, the issue of air pollution in developing nations should be more severe as developed countries tend to be more effective in addressing environmental issues.

In order to fund activities to battle environmental concerns, cash could be important. Generally, these environmental investments are quite expensive, and there is no guarantee for associated financial returns. According to the pecking order theory, cash is the least expensive because of asymmetric information. Information asymmetry is a major problem, particularly in developing economies, making it difficult for

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firms to get external financing at a reasonable cost. Therefore, if firms in highly polluted areas need to tackle environmental issues, a natural tendency would be to rely on the internally generated cash flows or cash holdings, or a positive association between air pollution and cash holdings in a developing country could be expected. On the other hand, it is also likely that less stringent pollution-mitigating measures in less developed nations refrain firms from saving cash to invest in activities required to address environmental pollution, leading to an insignificant relationship between air pollution and cash holdings in such countries.

Various studies have identified determinants of corporate cash holdings. The macro-level factors include governmental effectiveness (D. Chen, Li, Xiao, & Zou, 2014; R. R. Chen, El Ghouli, Guedhami, & Nash, 2018; Thakur & Kannadhasan, 2019), culture (Y. Chen et al., 2015), legal efficiency (Shah & Shah, 2016), public trust (Dudley & Zhang, 2016), political ambiguity (Phan, Nguyen, Nguyen, & Hegde, 2019; Xu, Chen, Xu, & Chan, 2016), tax ambiguity (Hanlon, Maydew, & Saavedra, 2017), banking sector stability (Cui, Cuong, & Shimizu, 2020). However, there is little research on how air pollution, a macro-level determinant, affects cash holdings. Until recently, only B. Li et al. (2021) and Tan, Tan, and Chan (2021) have examined this link in China pointing to a positive relationship between the two factors but the time of the study is short (2013 – 2017), and the outcome could have been affected.

Debt could affect firms' tendency to invest in environmental R&D since highly indebted firms tend to be more financially constrained, at least compared to trade credit-financed firms (Guo, Su, Song, Hu, & Finance, 2022). Therefore, even when firms are located in highly polluted areas, managers are not likely to save cash for environmental investments if they have piles of debt to pay back. Once again, environmental projects do not provide a financial return, while eating up firms' resources. Vietnamese listed firms rely on debt financing due to the ubiquitous presence of banks. At the same time, Vietnam's environmental restrictions are quite lax, incentivizing firms to prioritize debt payback. Given this setting, the research seeks to confirm the impact of the interaction between leverage and air pollution on corporate cash holdings.

The current study makes a variety of literary contributions. Firstly, it examines the link between air pollution and cash holdings in a highly relevant context - Vietnam, a developing country. This context is relevant due to several rationales. First, to the best of our knowledge, no research has been conducted in this country. Second, Vietnam has a fledgling financial market and a high level of information asymmetry, so cash is a highly important source of financing (X. V. J. I. R. o. F. Vo, 2018). Therefore, firms should have fewer incentives to invest in activities to solve pollution issues when the requirements are still lax and the outcome of the investment is not certain. Therefore, the impact of air pollution on cash holdings could be different in Vietnam compared to the findings of previous studies. Third, we believe that firms should have incentives to refrain from cash hoarding for environmental concerns if there is more debt. Vietnam's banking system is considered an important source of financing and debt accounts for a large proportion of firms' liabilities. If debt tends to deter firms from saving cash to address environmental issues, this should be of important implications to stakeholders who care for the environment. We offer a range of robustness checks, after which the main results remain unchanged, which lends credence to our findings.

## **2. THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT**

### **2.1. Theories**

#### **2.1.1. Trade-off theory**

The trade-off theory posits that firms' cash holdings are determined by weighing the marginal utility of holding cash against the marginal costs associated with it (Myers, 1984). The marginal benefits of retaining cash include reducing the risk of financial distress, facilitating the implementation of focused corporate

environmental responsibility strategies, and avoiding the costs associated with external financing or asset sales based on the precautionary motive proposed by (Keynes, 1936). In an unfavorable market, external funding may be difficult or expensive to obtain, necessitating an increase in internal funds such as cash reserves to address the costs of air pollution and mitigate associated risks. Consequently, air pollution can have a positive impact on a firm's cash holdings.

### **2.1.2. Neoclassical theory**

According to the neoclassical economic theory, corporate environmental responsibility practices are expected to increase costs and reduce shareholder wealth (Ruf, Muralidhar, Brown, Janney, & Paul, 2001). Harper and Sun (2019) contend that environmentally irresponsible businesses often prioritize cash utilization to maximize shareholder value and avoid conflicts between management and shareholders. In developing countries, where air pollution regulations may be insufficient and weak, companies may adopt a more cautious financial allocation strategy by holding more cash reserves to invest in projects with predictable future profits rather than investing in research on environmental pollution (Chang, Graff Zivin, Gross, & Neidell, 2019). Consequently, a negative correlation between a company's cash holdings and air pollution may exist.

### **2.1.3. Pecking order theory**

According to the pecking order theory, firms have a preference for utilizing internal financing primarily, such as cash, due to the absence of external transaction costs. In cases where internal financing is insufficient, firms resort to debt issuance, followed by equity as a last option. The theory emphasizes the expensive nature of external finance (Myers, 1984), and moreover, the pressure that arises from using debt, which motivates companies to invest efficiently to generate profits that can be used to pay off the debt. Therefore, among investment sectors, companies that are indebted typically prioritize the use of cash holdings to fund exceptionally profitable investment initiatives rather than infrequently profitable investments in pollution control (Anderson et al., 2017). Consequently, it is expected that debt plays a moderating role in the relationship between air pollution and cash holdings.

## **2.2. Hypothesis development**

The literature suggests a number of harmful impacts of air pollution on dwellers and degrade living quality (Plaisier et al., 2010; Stafford, 2015). Air pollution impairs cardiac and respiratory function, increasing the fatality rate. B. A. Franklin, Brook, and Pope III (2015) attribute the number of sick days to air pollution. Not only does air pollution degrade physical healthy, but it also exerts a depressing effect (Q. Zhang et al., 2017), causing nervousness and irritation (Evans, Colome, & Shearer, 1988) as well as suicide (Bakian et al., 2015).

As far as firms are concerned, air pollution could lead to poor decision-making. Ackert, Church, and Deaves (2003) argue that air pollution diminishes people's capacity for information processing. Firms might also have to hoard cash to offer welfare benefits to keep employees or to pay healthcare expenditures (Akpalu & Normanyo, 2017). Failing to adhere to environmental regulations causes enterprises to experience a sharp decline in stock values (Ramiah, Martin, Moosa, & Finance, 2013). Tan, Zhang, Zhang, and Chan (2021) suggest that air pollution can enable pessimism and lower management cognitive capability, as a result, firms tend to raise cash holdings to prevent risk. To sum up, firms have multiple reasons to address environmental issues, as far as performance-related rationales are concerned.

According to D. Zhang, Du, Zhuge, Tong, and Freeman (2019), they conduct research on China's manufacturing firms and discover that because of its high liquidity and low financial cost, cash reserves can greatly aid in financing pollution investment, avoiding having to raise funds repeatedly and frequently. They

discover that financially-constrained firms are more likely to use internal funds like cash to finance pollution investments. In addition, G. Zhang, C. Fang, W. Zhang, Q. Wang, D. J. E. M. F. Hu, et al. (2019) show that in industries that are more labor and pollution-intensive, the impact of cash on pollution investment is especially significant.

Finally, to battle air pollution, governments have been introducing a number of environmental policies (H. Zhang et al., 2016). Environmental taxes and administrative fines have increased environmental costs for businesses such as purchasing and installing environmentally friendly and efficient equipment, forcing investments in anti-pollution measures (Hu, Xue, Liu, & Finance, 2022). In addition, businesses find it expensive and challenging to attract outside financing because of the asymmetric information and substantial uncertainty surrounding the execution of environmental rules (Duchin, 2010; Xu et al., 2016), managers are forced to rely only on internal finance, causing an increasing desire for cash (B. Li, Guo, & Zeng, 2019). As a result, large cash holdings are required by businesses for cautious motives (Keynes, 1936).

Accordingly, cash holdings are assumed to correlate positively with air pollution.

H1: Air pollution is positively associated with cash holdings.

Air pollution lowers risk-taking incentives for firms. Air pollution tends to reduce firm investment in risky projects (B. Li et al., 2021). In addition, air pollution can enhance pessimism and lower management cognitive ability (Tan, Zhang, et al., 2021). As there is lower risk related to investment, firms might have less need to hold cash for precautionary reasons.

When studying large public enterprises in the US, Harper and Sun (2019) found that businesses preferred to put money into initiatives that would likely have fewer agency conflicts and would maximize shareholder value over environmental efforts. Thus, it is anticipated that cash holdings will negatively correlate with environmental contamination.

Interestingly, Tan, Tan, et al. (2021) find that firms with more cash holdings tend to have lower performance in highly polluted cities in China, compared to less polluted ones. Therefore, this evidence could imply that firms should not hold much cash in highly polluted environments. First, if air pollution mentally makes executives more risk averse, firms tend to conduct less investment, especially risky investment, thus making cash holdings costly and prone to agency cost and opportunity cost. Second, the regulations in Vietnam might not be as strict as in other jurisdictions, so the need for cash holdings to address environmental issues should be lower.

Vietnam has actually experienced the fastest-growing per-capita greenhouse gas emitter annually in 20 years (Tran, Drogui, Doan, Le, & Nguyen, 2017). Furthermore, the unsustainable exploitation of natural resources has been alarming and adversely affected long-term growth. It seems that coupled with the strong increase in urbanization and economic growth, air pollution is the cost that Vietnam is paying. Even though stricter laws have been introduced with some enforcement of dust management measures, and enhanced monitoring of industrial emissions, the enforcement is still not adequate (International Trade Administration, 2021). According to Provincial Governance and Public Administration Performance Index Surveys, the percentage of respondents choosing the environment as their biggest concern has dropped from 12.53 percent to 8.85 percent from 2016 to 2019. Finally, studying Vietnamese Environmental Protection Law, Thi Nguyen (2020) associates it with backward legislation and the enactment capacity is still low.

As a result, air pollution should be negatively related to cash holdings.

H2: Air pollution is negatively related to cash holdings.

If firms need to invest in pollution-abatement activities, cash might help due to its low cost, at least

compared to trade credit (G. Zhang, C. Fang, W. Zhang, Q. Wang, D. J. E. M. F. Hu, et al., 2019). Cash enables firms to continue to fund their current projects in the event of any shocks to the credit market (Campbell, Hilscher, & Szilagyi, 2008; Kaplan & Zingales, 1995). Because pollution control investment is expensive and does not provide financial returns, compared to investments in production, firms are more inclined to utilize cash than debt when investing in pollution protection. Debt puts firms under pressure to pay it back, which encourages them to invest effectively. This negative effect might be stronger when cash plays a more significant role as a source of financing. In a developing country like Vietnam, information asymmetry is high and the cost of external financing is high, accordingly. Furthermore, the regulatory strictness is low, compared to other countries, to allow more foreign direct investment and economic growth. These institutional traits make it more likely for firms to use cash for activities that generate profits to pay for loans, rather than investments in pollution control.

From the above arguments, debt may weaken (strengthen) the positive (negative) effect of cash holdings on investments in pollution control, in line with the argument that debt reduces the capacity for environmental research (G. Zhang, C. Fang, W. Zhang, Q. Wang, D. J. E. M. F. Hu, et al., 2019). Therefore, it is expected that leverage reduces the correlation between air pollution and cash holdings.

H3: Leverage has a moderating effect on the relationship between air pollution and cash holdings.

### 3. RESEARCH METHODOLOGY

The research sample in this study is non-financial firms listed on the Vietnam Stock Exchange in the six years from 2016 to 2021. We removed observations that have extreme values, such as negative equity or total debt larger than total assets. Firms in the financial sector including banks and financial institutions and insurance companies are excluded from the sample because their financial statements differ significantly from the rest (Al-Najjar & Hussainey, 2011; Pandey, 2001). The final dataset consists of 2128 observations, covering 385 firms. We have gathered information on air pollution using the particulate matter measurement index (PM2.5) over the years 2016 to 2021 from the contribution of the General Consulate of the US in Vietnam.

To test the individual effect of air pollution on cash holdings (Hypotheses H1 and H2), the baseline model in this research is as follows (B. Li et al., 2021):

$$\text{Cash}_{i,t} = \beta_0 + \beta_1 \text{PM2.5}_{i,t} + \beta_2 \text{Size}_{i,t} + \beta_3 \text{Levi}_{i,t} + \beta_4 \text{CFO}_{i,t} + \beta_5 \text{PTBi}_{i,t} + \beta_6 \text{NWC}_{i,t} + \beta_7 \text{ROAi}_{i,t} + \text{Industry dummies} + \mu_{i,t} \quad (1)$$

To test the moderating effect of leverage on the link between air pollution and cash holdings (Hypothesis H3), the interaction term is added as follows:

$$\text{Cash}_{i,t} = \alpha_0 + \alpha_1 \text{PM2.5}_{i,t} + \alpha_2 \text{Levi}_{i,t} + \alpha_3 \text{PM2.5} * \text{Levi}_{i,t} + \alpha_4 \text{Size}_{i,t} + \alpha_5 \text{CFO}_{i,t} + \alpha_6 \text{PTBi}_{i,t} + \alpha_7 \text{NWC}_{i,t} + \alpha_8 \text{ROAi}_{i,t} + \text{Industry dummies} + \epsilon_{i,t} \quad (2)$$

Where:  $i,t$  represent firm  $i$  in year  $t$ . Cash is measured by cash and cash equivalents divided by total assets (Guizani, 2017; Habib, Hasan, & Al-Hadi, 2017). Cash and cash equivalents are reported in cash flow statements, which refer to cash on hand, bank deposits that are readily available for payment and their equivalents.

PM2.5 is the proxy for air pollution, referring to particulate matter with an aerodynamic equivalent diameter of less than or equal to 2.5 microns in the atmosphere, which can go directly to the alveoli. PM2.5 is a very popular measure of air pollution, see, for example (X. Li, Jin, & Kan, 2019; Tan, Tan, et al., 2021). Unfortunately, other measures of air pollution in Vietnam are quite limited, resulting in a considerable loss in observations. Therefore, we decide only use PM2.5 as our sole proxy for air pollution.

Firm size (Size) is measured as the logarithm of total assets at the end of year t. Leverage (Lev) is computed as the ratio of total debt to total assets (X. Li et al., 2019; Tan, Tan, et al., 2021). Cash flow (CFOA) is also accounted for, because firms that have higher operating cash flows, calculated as the ratio of operating cash flow to total assets, may hold more cash (Opler, Pinkowitz, Stulz, & Williamson, 1999). Growth opportunities (PTB) are measured as the ratio of the market value to the book value of equity. Net working capital (NWC) is measured by the difference between current assets and current liabilities and divided total assets. Return on assets (ROA) is defined as net income divided by total assets. Finally, firms of different industries may have different levels of cash due to their intrinsic operating styles. Therefore, industry dummies, following Thomson Reuters classification, are added to control for this potential.  $\mu$ ,  $\epsilon$  are the residuals in the models.

The current research employs estimation strategies including OLS, fixed effects model, and random effects model. Other defects including heteroskedasticity and autocorrelation could also be handled using random effect model cluster standard error. Furthermore, to determine whether multicollinearity between variables exists, this study performed the Variance Inflation Factor (VIF) test to check for panel data. The results of the VIF test show that all coefficients are less than 10, which means that multicollinearity does not occur in the studied number (Kennedy & Kennedy, 1992).

#### 4. RESULTS AND DISCUSSION

##### 4.1. Descriptive statistics

Table 1 provides the descriptive statistics for the variables in the empirical models. The average value of cash holdings in Vietnam is 15.7%, roughly the same as in the study of (Tan, Tan, et al., 2021) for Chinese companies for the period from 2013 to 2018. The average value of PM2.5 air pollution concentration is 88.3, ranging from 35.59 to 117.78, suggesting that the overall air quality in Vietnam is poor, a very tiny percentage of persons who are extremely sensitive to air pollution may have a mild health risk for some contaminants. According to a 2022 annual survey by IQAir, Vietnam was ranked 30th in the globe and third most polluted country in Southeast Asia after Indonesia and Laos. The mean of leverage is about 19.6%, indicating that about one-fifth of total assets are financed by debt.

**Table 1. Descriptive statistics.**

Variable	Obs	Mean	Std.Dev	Min	Max
Cash	2282	0.157	0.165	0.00062	0.961
Size	2282	27.635	1.703	23.288	33.694
NWC	2281	0.083	0.211	-0.745	0.918
ROA	2245	0.057	0.077	-0.491	0.828
PTB	2136	1.355	1.702	0.022	42.269
Lev	2281	0.196	0.172	0	0.782
CFOA	2282	0.04	0.145	-1.083	1.115
PM2.5	2310	88.313	20.760	35.591	117.782

Source: author’s calculation from research data

##### 4.2. Correlation matrix

Table 2 presents the pairwise correlation coefficients between variables in the research model. In general, most of the correlation coefficients between variables are quite low. Air pollution has a negative association with cash holdings, offering some first evidence to support the negative effect hypothesis, which implies that businesses’ operations and production can be impacted by air pollution. Pollution can lower

labor productivity, raise production costs, and harm an organization’s overall business operations. As a result, the company’s income and earnings may decline, which would lower its cash holdings. Nevertheless, the coefficients in the correlation matrix do not necessarily constitute a valid base for causal inferences, therefore, regression analysis is conducted to give a more robust basis.

**Table 2. Correlation matrix.**

Variables	Cash	Size	NWC	ROA	PTB	Lev	CFOA
Cash	1.0000						
Size	-0.1672	1.0000					
NWC	-0.2427	-0.2155	1.0000				
ROA	0.3318	-0.0109	0.0409	1.0000			
PTB	0.1236	0.2585	-0.1293	0.2727	1.0000		
Lev	-0.3428	0.3655	-0.2925	-0.2414	0.0070	1.0000	
CFOA	0.1776	0.0008	-0.1872	0.3324	0.0751	-0.1384	1.0000
PM2.5	-0.0519	0.0512	0.0449	-0.0338	0.0083	-0.0251	-0.0703

Source: author’s calculation from research data

### 4.3. Regression analysis

Table 3 provides regression results to analyze the relationship between cash holdings and air pollution levels of listed firms in Vietnam. OLS result suggests that PM2.5 does not have a significant association with cash at 10 percent, which is not in line with hypothesis H1, H2, and two theories: trade-off theory and neoclassical theory. This result also holds for the panel data regression technique that controls for individual effects which are prevalent due to panel data structure (Column 2).

The research result differs from those of previous studies to some extent. Tan, Tan, et al. (2021) when conducting on companies with A-shares listed on the Shanghai and Shenzhen Stock Exchanges between 2013 and 2018, report a positive relationship between the two factors, but claim that this is due to some cognitive bias: air pollution causes managers to be pessimistic in terms of earnings forecasts as well as suffer cognitive bias toward risk aversion. Tan, Tan, et al. (2021) also claim that the positive relationship between the two factors is due to the strict regulation of the Chinese government. Meanwhile, B. Li et al. (2021) based on information from Shanghai and Shenzhen A-share listed firms from 2013 to 2017 and air quality monitoring information made available by the China National Environmental Monitoring Center, argue that air pollution increases the level of cash holdings to fund investments in environmental activities. Nonetheless, B. Li et al. (2021) acknowledge that businesses that generate a significant amount of pollution are frequently the backbone of the community’s economy in China. If excessive measures are used against enterprises that produce a lot of pollution, negative impacts on local economic and social development could progress. As a result, the government might compromise and keep these polluting businesses operating normally, leading to these large enterprises feeling less pressure to keep cash for pollution-abatement measures. Therefore, even though a positive relationship between air pollution and cash holdings is recorded, it is still possible that if regulations are not so strict or the attitude of government/citizens is not demanding, this relationship could become insignificant.

The insignificant effect is recorded in the present study, which is the new finding of the research. First, the attitude of people towards protecting the environment is not serious and laws need to have stronger enactment in reality. This could be due to the fact that Vietnamese citizens have been accustomed to adapting to poor air quality over a long period of time, as a result of some sacrifice to attract foreign investment to facilitate economic growth. Second, there are a considerable number of vehicles commuting, contributing significantly

to air pollution by emitting combustion-related pollutants that have reached alarming levels. This is not related to firms' behavior, partly justifying the insignificant effect of air pollution on cash holdings.

We improve the robustness of the findings by adding important control variables. First, in Column (3), we control for the level of annual industrial production in each province. The impact of air pollution (if any) on cash holdings could be, indeed, due to the impact of high levels of industrial production, investment, and firm operations are obviously linked to decisions related to cash management. Second, in Column (4) we control for the level of corporate support policy in each province. If firms receive high support from local governments, it might imply that firms could be partly exempted from strict pursuance of environmental standards. Therefore, the inclusion of these extra variables could change the previous result. Nonetheless, PM2.5 is still insignificant and the size of the coefficient does not change markedly.

**Table 3. The effects of air pollution on cash holdings.**

Cash	(1) OLS	(2) REM-robust	(3) REM-robust	(4) REM-robust
Size	-0.011*** (0.002)	-0.013*** (0.004)	-0.013*** (0.004)	-0.013*** (0.004)
NWC	-0.302*** (0.016)	-0.279*** (0.028)	-0.279*** (0.028)	-0.279*** (0.028)
ROA	0.560*** (0.044)	0.240*** (0.049)	0.247*** (0.050)	0.241*** (0.050)
PTB	0.003 (0.002)	0.0009 (0.002)	0.0006 (0.002)	0.0006 (0.002)
Lev	-0.345*** (0.020)	-0.265*** (0.035)	-0.262*** (0.0002)	-0.263*** (0.035)
CFOA	-0.053** (0.023)	0.016 (0.020)	0.016 (0.020)	0.017 (0.021)
PM2.5	-0.0002 (0.0001)	-0.0003 (0.0002)	-0.0002 (0.0002)	-0.0003 (0.0002)
Industry dummies	Yes	Yes	Yes	Yes
pi			-0.0004 (0.0004)	
support				0.004* (0.003)
cons	0.460*** (0.060)	0.526*** (0.118)	0.574*** (0.123)	0.500*** (0.117)
F test p-value	0.000	0.000	0.000	0.000
R-squared	0.345	0.321	0.319	0.301
Standard error in parentheses; * Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.				

Source: author's calculation from research data.

Furthermore, we examine the factor of the Covid-19 outbreak. The virus outbreak already has a significant impact on firms worldwide in all aspects. Studies have shown that due to lockdown policies to prevent the spread of Covid-19, air pollution reduces. Additionally, the outbreak effectively affects investment opportunities and introduces uncertainty to firms' operations, obviously affecting cash holdings. Given that this factor affects both air pollution and cash holdings at the same time, we divide the sample into two periods: before 2020 (when there is no obvious impact of the Covid-19 outbreak) and from 2020 onwards.

Table 4 shows the estimation results for both periods, with (columns 1, 2) and without further control variables (columns 3, 4). PM2.5 remains insignificant throughout the four specifications, ensuring the robustness of the previous findings.



**Table 4. The effects of air pollution on cash holdings – Covid factor**

Cash	(1) Before	(2) During	(3) Before	(4) During
Size	-0.019*** (0.005)	-0.009** (0.005)	-0.019*** (0.005)	-0.010** (0.005)
NWC	-0.309*** (0.039)	-0.255*** (0.032)	-0.310*** (0.039)	-0.258*** (0.032)
ROA	0.306*** (0.063)	0.281*** (0.067)	0.308*** (0.063)	0.284*** (0.069)
PTB	0.005 (0.004)	-0.002 (0.002)	0.005 (0.004)	-0.002 (0.002)
Lev	-0.240*** (0.040)	-0.237*** (0.043)	-0.241*** (0.039)	-0.228*** (0.043)
CFOA	0.007 (0.033)	0.020 (0.023)	0.009 (0.033)	0.025 (0.023)
PM2.5	-0.0002 (0.0002)	-0.0005 (0.0003)	-0.0002 (0.0002)	-0.0002 (0.0004)
Industry dummies	Yes	Yes	Yes	Yes
pi			-0.003* (0.002)	-0.0004 (0.0004)
support			0.004 (0.005)	0.006 (0.003)
cons	0.660*** (0.132)	0.438*** (0.132)	0.960*** (0.245)	0.408** (0.166)
F test p-value	0.000	0.000	0.000	0.000
Standard error in parentheses; * Significant at the 10% level; ** Significant at the 5% level; *** Significant at the 1% level.				

Source: author's calculation from research data

In Vietnam, banks play a significant role in the financial market as the primary source of funding for businesses (Nguyen, Ta, & Nguyen, 2018; X. V. Vo, 2018). Saddour (2006) suggests that leverage can substitute cash for environmental investments, allowing companies to finance such projects through debt and reducing the need for large cash holdings. This allows companies to invest in machinery, equipment, and technology to innovate production methods and reduce air pollution, thereby decreasing their reliance on cash while mitigating the effects of pollution.

In other words, G. Zhang, Fang, Zhang, Wang, and Hu (2019) suggest that debt may have a negative effect on pollution protection investment due to its high financial cost, implying that businesses are more inclined to finance potentially profitable investment initiatives provided by external financing (Anderson et al., 2017), as a result, debt basically reduces the capacity for environmental research. Since investments in environmental R&D do not generate profits, firms taking out loans must put their attention on paying off debt rather than utilizing that cash to fund such projects. This effect should strengthen in a country with weak environmental laws/weak enforcement of environmental standards. As a result, it is anticipated that debt can moderate the relationship between cash holdings and air pollution. We ascertain this by examining the effect of the interaction between leverage and air pollution on cash holdings.

In Table 5, the variable  $PM2.5*Lev$  has a negative and significant association with cash, in line with hypothesis H3 that the leverage factor has a moderating significance of lessening the impact of air pollution on cash holdings of listed non-financial firms in Vietnam. This outcome provides empirical support for the pecking order theory. It is clear that in the case of Vietnam, due to more lax environmental regulation and enforcement and the attitude of citizens toward environmental issues, debt might emerge as a factor that reduces the need to invest in environmental protection activities. This effect is present for the whole period, as well as before and during the outbreak of Covid-19.

**Table 5. The moderating effect of leverage on the relationship between PM2.5 and Cash.**

Cash	Whole sample	During Covid-19	Before Covid-19
Size	-0.015*** (0.004)	0.012** (0.005)	-0.020*** (0.005)
NWC	-0.273*** (0.028)	0.242*** (0.033)	-0.306*** (0.038)
ROA	0.247*** (0.049)	0.287*** (0.068)	0.317*** (0.062)
PTB	0.001 (0.002)	0.001 (0.002)	0.005 (0.004)
CFOA	0.021 (0.020)	0.029 (0.024)	0.016 (0.033)
PM2.5	0.0001 (0.0002)	0.00002 (0.0003)	0.0003 (0.0002)
PM2.5*Lev	-0.003*** (0.0003)	-0.002*** (0.0005)	-0.002*** (0.0004)
R-squared	0.298	0.289	0.310

Standard error in parentheses; \* Significant at the 10% level; \*\* Significant at the 5% level; \*\*\* Significant at the 1% level. Lev variable does not exist in the model since it causes multicollinearity according to our Variance Inflation Factor test, not tabulated here.

Source: author’s calculation from research data

## 5. CONCLUSION

Holding the right amount of cash is important to capitalize on investment opportunities, to facilitate precautionary purposes yet effectively address opportunity cost/agency cost. Many studies have provided insights into understanding the changes in cash holdings; nonetheless, air pollution receives little attention, especially in the setting of developing countries. Using a sample of listed firms in Vietnam from 2016 to 2021, we document a non-significant association between air pollution and cash holdings, not confirming hypothesis H1, H2, and two theories: trade-off and neoclassical theory. Even though this is somehow inconsistent with the positive linkage found in studies in China, we offer some plausible explanations to harmonize the results. First, the environmental protection measures might force firms to increase cash to fulfill the requirements, lax regulations and enforcement together with the not so serious environmental concerns of people in Vietnam could lead to an insignificant link between cash holdings and air pollution. Second, air pollution could also have a negative impact on cash holdings if managers are made more risk-averse. This is because they might invest in less risky projects or just fewer projects overall, so less cash is required.

In addition, we find that leverage facilitates a negative association between air pollution and cash holdings, in line with hypothesis H3 and pecking order theory. Since activities in environmental protection do not generate returns, firms taking out loans must prioritize debt payment. This effect should strengthen in a country with weak environmental laws/weak enforcement of environmental standards, such as Vietnam. This implies that for a firm to be more environmentally responsible, its debt levels should be lower to allow it to have more flexibility to care for investments in environmental protection.

### 5.1. Implications

This study has important implications for decision-makers, investors, managers, and other involved parties. First, the research findings indicate a non-significant association between air pollution and cash

holdings in a developing country like Vietnam. Therefore, decision-makers and policymakers should shift their attention to other critical effects of air pollution, such as public health, environmental sustainability, and social well-being, when formulating policies and making decisions. Second, managers should acknowledge that air pollution may not have a significant direct impact on cash holdings and should instead focus on implementing effective financial management strategies to maintain liquidity and cash flow stability. Additionally, recognizing the leverage facilitates a negative association between air pollution and cash holdings, managers should assess leverage levels, employ risk management measures, and adopt sustainable business practices to mitigate environmental risks.

## 5.2. Limitations and prospects

Our study has certain limitations that provide new possible avenues for future research. First, the data on air pollution has been only collected from a few significant cities, which may not be representative of the entire population so there is a call for research on gathering more random and representative data on air pollution in other Vietnamese provinces in the future. Second, the study period was relatively short, with the analysis data only examined for the years 2016 through 2021. For thorough research, later studies can incorporate data from a larger range of years. Third, the research has been limited to Vietnam's listed firms, its generalizability may be constrained. Therefore, future research should continue with more developing countries and examine whether the findings hold.

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## FINANCIAL LEVERAGE AND INVESTMENT DECISIONS IN VIETNAMESE LISTED COMPANIES

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**ABSTRACT:** *This research examines the impact of financial leverage on investment decisions by using unbalanced panel data of Vietnamese listed companies for 13 years from 2008 to 2021. The fixed effect model is applied to investigate this relationship. The results show that financial leverage has a positive impact on investment decisions in Vietnamese listed companies during the studied period. Also, there is an existence of long-term effects of leverage on investment decisions. Unlike previous studies, we investigate the effect of CEOs' characteristics, namely CEO's ownership, duality, age, gender and education level on the relationship between leverage and investment. The results highlight that the positive impact of leverage on investment is reduced when the age and education level of the CEO are higher, however, this relationship becomes stronger in case of the existence of CEO's ownership. We do not find the effect of CEO's gender and duality on the link between financial leverage and investment. These findings will be useful to shareholders in making decisions on selecting the right manager for the firm.*

**Keywords:** *financial leverage, investment decisions, CEOs' characteristics*

### 1. INTRODUCTION

A wise investment decision will help increase the value of the companies, consequently enhancing the owner's asset worth (Nga, Dien, Linh, & Tuoi, 2019). For this goal, the first step is to choose whether a form of capital (short-term capital, long-term capital, equity, or debt) will be utilized to invest in assets. Over the past decades, many studies have been conducted on debt and investment decisions, but controversial with inconsistent conclusions. The majority of global studies reveal a negative association between financial debt and investment decisions (Aivazian, Ge, & Qiu, 2005; Jensen & Meckling, 1976; Lang, Ofek, & Stulz, 1996; Odit & Chittoo, 2008; Sajid, Mahmood, & Sabir, 2016; Stulz, 1990), while other authors show a positive correlation between financial leverage and investment decisions (Franklin & Muthusamy, 2011; Thi Bich Ngoc, Ichihashi, & Kakinaka, 2022; Trang & Quyen, 2013).

Previous studies have primarily focused on the contextual influences that determine the link between financial leverage and investment decisions, such as growth rate, state ownership and crisis. However, CEO characteristics are also factors of concern. According to agency cost theory suggested by Jensen and Meckling (1976), this association might be impacted by differences in maximizing utility between managers and executives. In addition, the upper echelons theory (UET) suggests that each chief executive officer (CEO) approaches investment decisions differently. In particular, some researchers have published their findings, but there have been no obvious conclusions about the impact of CEO's on the link between financial leverage and companies' investment decisions (Bathala, Moon, & Rao, 1994; Fosberg, 2004; Friend & Lang, 1988; Hasbrouck & Schwartz, 1988; Kaur & Singh, 2021; Stulz, 1990).

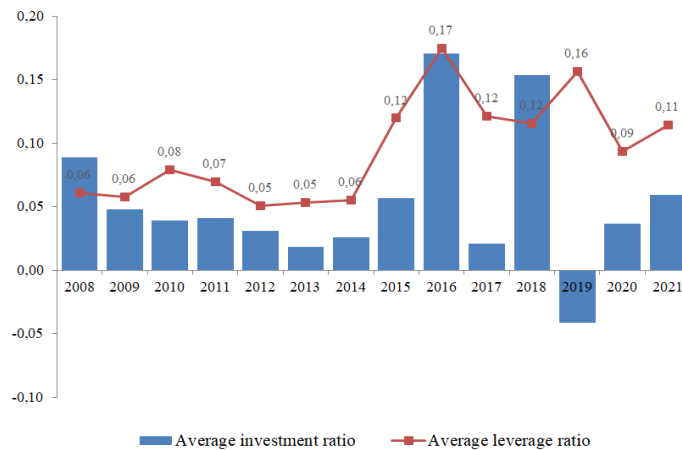
Furthermore, the majority of previous studies on the relationship between financial leverage and investment decisions have been conducted in advanced countries and not much studies in developing

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countries. As a developing country, Vietnam has approximately 98% of enterprises classified as small and medium sized (Ministry of Planning and Investment, 2021). These enterprises face many difficulties due to lack of internal capital, experienced labor and financial resources. Therefore, to get more investment capital, firms only choose to borrow capital from commercial banks.

During the research period, there were unanticipated changes in the average investment ratio and average leverage ratio of Vietnamese listed companies based on the reviewed sample data. Due to variation of these two factors over time (figure 1), investigating this relationship in Vietnam has become necessary.



**Figure 1. Average investment and leverage ratio of Vietnamese enterprises from 2008 to 2021**

(Source: Authors' Calculation on self-collected data.)

In summary, the topic of leverage-investment has been investigated in financial literature, but it is inconclusive. Specifically, the role of CEO characteristics in the relationship between financial leverage and investment has not yet been investigated. Moreover, most studies have focused on samples from developed countries such as the U.S, China, Canada, the case of developing transition countries like Vietnam have a few empiricals. Although Vietnam and China have some culture, society and politics in common, Vietnam also has many differences, such as the size of its economy and companies, its history of transformation, its level of openness to the global economy, and its emerging financial market. Studying in a Vietnamese context is believed to be valuable for corporate financial empirical. Therefore, we have chosen to study the topic “Financial leverage and investment decisions in Vietnamese listed companies”.

## 2. THEORETICAL FRAMEWORK

### 2.1. LEVERAGE AND INVESTMENT THEORIES

Modigliani-Miller (1958) concluded that under the assumption of perfect capital markets, the value of companies does not rely on which financial source is utilized to invest, and a firm's financial leverage ratio has no effect on the firm's value and hence a firm's financing and investment decisions are independent. In the case of taxes, however, M&M (1963) argued that companies will choose capital with lower interest rates to avoid paying more taxes; a firm's financial leverage ratio influences capital costs, affecting the firm's value and investment decisions. Despite significant advances in the research process, M&M ignores the cost component owing to the danger of utilizing debt and the asymmetric information, even though the information asymmetry is the primary reason which causes agency concerns with agency costs.

According to Jensen and Meckling (1976), agency costs arise due to conflicts of interest between shareholders and management. As a result of these conflicts, corporate managers tend to select a capital structure that maximizes their own benefits rather than the benefits of the company's shareholders. While financial leverage may provide tax advantages (Modigliani & Miller, 1958), Jensen (1986) argues that the temptation to use cash flow for interest and loan payments can constrain managers' rewards (in terms of salary, reputation, etc). Consequently, managers may adopt strategies to limit or reduce the use of financial leverage in investment decisions in order to protect their current position and income.

## 2.2. Related Literature and Hypothesis development

Using a range of methodologies and reasons, studies on the influence of financial leverage on investment have found inconclusive outcomes.

Myers (1977) discovered a negative association between financial leverage and investment in his study on the influence of financial leverage in corporate governance. He contends that when debt usage is high, the odds of completing projects with positive net present value are reduced, hence creditors will also receive a portion of the return on investment, utilizing more debt would harm shareholders' interests. In other words, a high debt ratio may cause management to pass up investments with positive net present values. Hence, the agency problem develops when debt drives underinvestment; the more debt, the less investment. Jensen (1986) and Stulz (1990) suggest that the conflict between management and shareholders is the primary source of the detrimental impact of financial leverage on investment decisions. Managers seek to grow the company's size even if it involves unsuccessful initiatives and lower shareholder returns, resulting in overinvestment. As a result, management's exploitation of the company's free cash flow is reduced, and minimizing investment. Although conducted at different periods and locations, McConnell and Servaes (1995), Lang et al (1996), Aivazian et al (2005), Firth et al (2008) all show that leverage prevents investment decisions. On the other hand, Hite et al (1977) show a positive link between financial leverage and investment decisions. Financial leverage allows organizations to pay fewer taxes while increasing earnings. Besides, financial leverage encourages higher investment while lowering financial risk hence the cost of bond financing. He also demonstrates that when businesses compensate for all choice factors, the effect of financial leverage is significantly different when production, investment, and financing decisions are examined concurrently.

According to our research, there has been some published empirical evidence in Vietnam connected to the relationship between financial leverage and corporate investment decisions. However, the findings of these investigations are conflicting. Trang and Quyen (2013) discovered that financial leverage is positively correlated with the investment activities of companies in general and companies with high growth opportunities, but it is negatively correlated with investment for firms with few growth opportunities. Thao (2014), Nguyen and Loc (2018) found that financial leverage is negatively correlated with investment activities for both companies with high growth potential and companies with low growth potential. However, Thi Bich Ngoc, Ichihashi and Kakinaka (2019) found that financial leverage has a positive impact on investment decisions after examining the link between financial leverage and investment decisions in Vietnamese SMEs.

Based on a theoretical assessment and empirical data, it is evident that the majority of research demonstrates a negative influence of financial leverage on investment decisions. This is because a high debt ratio raises the chance of a company going bankrupt, puts pressure on interest expenditures, and encourages enterprises to decrease investments to avoid liquidity concerns. As a result, the authors propose the first hypothesis as follows:

*H<sub>1</sub>: There will be a positive relationship between financial leverage and investment decisions.*

### **2.3. Theoretical basis of CEO's impact on the relationship between financial leverage and investment**

Over the past two decades, research in behavioral finance has increasingly played an important role in explaining financial decisions that traditional finance theories have not explained clearly. The upper echelons theory (UET) supposes that executives' different traits have an impact on structure and strategy and therefore it will directly have an impact on a firm's strategic courses of action and organizational performance (Nielsen & Huse, 2010). There is growing empirical evidence that manager-specific characteristics have a significant effect on financial decisions such as capital (Bertrand & Schoar, 2003; Graham & Harvey, 2001; Kaur & Singh, 2021). Among which, Kaur and Singh (2018) believed that the qualities of managers have a considerable effect on financial leverage's usage. However, empirical evidence on the presence of CEO's impact on the relationship between a business's financial leverage and investment decisions have been still absent. Meanwhile, since Vietnam transitioned to a market management mechanism, businesses have been self-accounting and allocating capital sources. As a result, the CEO has played an important role in the financial decision-making of companies. Therefore, the authors widened the understanding of the important function played by CEOs in order to explore the influence of CEO characteristics on the relationship between financial leverage and investment decisions. We consider CEO education level, gender, age, ownership and duality as CEO characteristics:

#### **CEO's Education**

According to Finkelstein and Hambrick (1996), highly educated CEOs are more likely to take chances and risk seeking. Similarly, Bertrand and Schoar (2003) discovered that managers with master's degrees are more likely to utilize debt for investments. They supposed that these managers are more open and proactive in using debt when growth prospects appear. In contrast to the preceding findings, Kaur and Singh (2018) found no association between education level and the decision to use financial leverage. As such we offer the following hypothesis:

*H2: The education level has a positive impact on the association between financial leverage and investment decisions.*

#### **CEO's Gender**

Difference in manager's gender will lead to diversity in the style of leadership and decision-making. Faccio et al (2016) discovered that firms led by female CEOs have more consistent earnings, a lower debt ratio in their capital structure, and these are less likely to go bankrupt than companies led by male CEOs. According to behavioral finance theory, women have a smaller degree of overconfidence bias than males, which along with differences in family duties and societal norms, results in a higher level of apprehension women face more risks and precautions (Bernasek & Shwiff, 2001; Hudgens & Fatkin, 1985). Males are more likely to occupy CEO roles in enterprises in Vietnam. However, in recent years, Vietnam has been a bright spot in Southeast Asia for gender diversity, with recent studies indicating that Vietnam has a substantial number of women holding high positions such as CEOs and corporate executives. Hence, we consider the CEO's gender in this study. The following hypothesis is proposed:

*H3: Female CEOs have a negative influence on the link between financial leverage and investment decisions.*

#### **CEO Age**

According to UET, older CEOs are more risk averse and indecisive than younger generations (Hambrick & Mason, 1984). As a result, they will prioritize internal capital sources compared to loans.



Moreover, managers may be in a period of economic stability, the objective of safety and minimal risk in the profession will be prioritized. Thus, any threats to their stability are ruled out (Carlsson & Karlsson, 1970). Other research indicates that elderly CEOs have less cash and wield less leverage (Bertrand & Schoar, 2003; Serfling, 2014). Based on the theoretical considerations presented above, the authors offer the following hypothesis:

*H4: CEO age has a negative influence on the link between financial leverage and investment decisions.*

### **CEO Ownership**

According to research on the relationship between CEO equity ownership and firm capital structure, increasing management ownership can help businesses reduce the use of leverage to minimize bankruptcy risk, supporting the view that there is a negative relationship between ownership ratio and leverage (Bathala et al., 1994; Friend & Lang, 1988; Hasbrouck & Schwartz, 1988). Bathala et al (1994) explained firms accept a trade-off between equity and debt in order to control agency costs. When the CEO invests a major portion of his assets in the firm as a shareholder owning shares, CEO's benefits are connected to the value of the companies. Thus, CEOs will strive to minimize or limit the use of financial leverage in the company's investment activities due to using cash flow to pay interest and debt would lower managers' rewards (Fosberg, 2004; Jensen, 1986; Kaur & Singh, 2021; Stulz, 1990). From that, we proposed the following hypotheses:

*H5: CEO share ownership ratio has a negative influence on the link between financial leverage and investment decisions.*

### **CEO Duality**

When the Chairman of the Board (COB) and CEO are held by one person, this is referred to as duality. In terms of the decisions to use debt, Wellalage and Locke (2012) discovered that duality reduces communication conflicts with the management team and creates a clear sense of unity in decisions. On the other hand, Fosberg (2004) argued that organizations with a two-tier leadership structure are more likely to use the appropriate amount of debt in their capital structure than organizations where the CEO is dual. He discovered that organizations with a two-tiered leadership structure had greater debt/equity ratios, however, it is not statistically significant. We suggest the following hypothesis:

*H6: CEO duality has a negative influence on the link between financial leverage and investment decisions.*

## **3. RESEARCH METHOD**

### **3.1. Research models**

The author conducts statistical description analysis, correlation analysis to eliminate multi-collinear phenomena between independent variables. We use regression estimation of effects via ordinary least square (OLS), fixed effects model (FEM), and random effects model (REM) regression approaches. After selecting the appropriate method to run the model, the author tests the statistical assumptions regarding the impact coefficient, multicollinearity, and heteroscedasticity. Then, overcome the model's defect by robust or cluster standard error.

We use the basic model mentioned by Aivazian et al (2005). We also include growth opportunities, firm age and liquidity factor and return on assets ratio. These control variables have been incorporated to provide possible influences on investment decisions (Cevik & Miryugin, 2022; Doan & Nguyen, 2018; Firth, Lin, & Wong, 2008; Nguyễn & Lộc). Specifically, the model is expressed as follows:

$$INV_{i,t} = \alpha + \beta_1 LEV_{i,t} + \beta_2 CF_{i,t} + \beta_3 TBQ_{i,t} + \beta_4 ROA_{i,t} + \beta_5 LIQ_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 AGE_{i,t} + \varepsilon_{i,t} \quad (1)$$

INV represents the net investment of companies, determined by the net investment to total assets of the current year (INV1). LEV is the financial leverage, which is measured using two proxies. The first one is calculated by dividing the total long-term debt by the total assets (LEV1). The ratio indicates the dominant role of long-term debt (Aivazian et al., 2005) and we used this proxy in this study. The second proxy is the ratio of total debt to total assets (LEV2), which would be used as a robustness test, and the remaining variables will be introduced in Table 1.

In addition, we consider the CEO’s characteristics such as age, educational level, gender, share ownership rate, and duality. We determine the impact of CEO’s characteristics on the relationship between financial leverage and investment decisions basing on the following model with interactive variable:

$$INV_{i,t} = \alpha + \beta_1 LEV_{i,t} + \beta_2 CF_{i,t} + \beta_3 TBQ_{i,t} + \beta_4 ROA_{i,t} + \beta_5 LIQ_{i,t} + \beta_6 SIZE_{i,t} + \beta_7 AGE_{i,t} + \beta_8 CEOage_{i,t} + \beta_9 CEOownership_{i,t} + \beta_{10} CEOedu_{i,t} + \beta_{11} CEOdual_{i,t} + \beta_{12} CEOgender_{i,t} + \beta_{13} CEOage*LEV_{i,t} + \beta_{14} CEOownership*LEV_{i,t} + \beta_{15} CEOedu*LEV_{i,t} + \beta_{16} CEOdual*LEV_{i,t} + \beta_{17} CEOgender*LEV_{i,t} + \varepsilon_{i,t} \quad (2)$$

Moreover, we also consider the one-period lagged (t-1) impact of financial leverage on corporate investment based on the regression model:

$$INV_{i,t} = \alpha + \beta_1 LEV_{i,t-1} + \beta_2 CF_{i,t-1} + \beta_3 TBQ_{i,t-1} + \beta_4 ROA_{i,t-1} + \beta_5 LIQ_{i,t-1} + \beta_6 SIZE_{i,t-1} + \beta_7 AGE_{i,t-1} + \varepsilon_{i,t-1} \quad (3)$$

### 3.2. Variable measurement

The variables used in the above research model are measured in detail in the table measuring the representative variables used in the model.

**Table 1. Variable definitions**

Variable	Code	Measures	Previous studies
<b>Dependent variable</b>			
Investment 1	INV1	Net capital expenditure (capital expenditure minus depreciation)/ total assets for the current year	Firth et al (2008); Danso, A., Lartey, T., Fosu, S., Owusu-Agyei, S. and Uddin, M. (2019); Nga et al(2019).
Investment 2	INV2	Net investment/ lagged net fixed assets= (Capital expenditure- depreciation)/ lagged net fixed assets	Lang et al. (1996), Aivazian & Qiu, J. (2005), Odit và Thu Chittoo (2008), Mehmet Umutlu (2009); Segara, R., & Yang, J. Y. (2020).
<b>Independent variables</b>			
Leverage 1	LEV1	Long-term debt /Total assets	Aivazian et al (2005); Franklin & Muthusamy (2011).
Leverage 2	LEV2	Total debt / total assets	Chen (2004), Chava and Roberts (2008); Chen et al (2010); Pamela et al (1983); Mehmat (2009), Ahn et al(2005).
Cash flow	CF	Operating cash flow/ net fixed asset	Odit and Chittoo (2008); Khurshed, Syed & Habib, A (2013); Firth et al (2008); Franklin & Muthusamy (2011).
Tobin’s Q	TBQ	(Market value of common equity + Total assets – Common equity – Deferred taxes) / Total assets	Segara, Reuben, and Jin Young Yang (2020); Franklin & Muthusamy (2011).
ROA	ROA	Ratio of earnings before interest, taxes, depreciation and amortization (EBITDA) to total assets	Franklin & Muthusamy (2011) Luciano, R. (2003); Fosu (2013)
Size	Size	Log of total assets	Franklin & Muthusamy (2011). Odit và Chittoo (2008); Khurshed, Syed et al (2013); Serhan Cevik and Fedor Miryugin (2020).
Age	Age	The logarithm of years since the firm was organized	Firth et al (2008), Serhan Cevik and Fedor Miryugin (2020), (Diaz et al., 2016; Doan and Nguyen, 2018).
Liquidity	LIQ	Current assets/Current liabilities	Dejong et al (2018); Franklin & Muthusamy (2011).

CEO Age	CEOage	A logarithm numeral variable expressing age of the CEO adjusted by year	Hambrick & Mason (1984), Carlsson & Karlsson (1970), Bertrand & Schoar (2003), Serfling (2014), Kaur, R., & Singh, B. (2021).
CEO Ownership	CEOownership	Ratio of number of shares owned by the CEO to the number of outstanding shares of the firm	Bathala et al (1994), Jensen (1986); Stulz (1990); Fosberg (2004); Kaur and Singh (2018), Kaur, R., & Singh, B. (2021).
CEO Duality	CEOdual	A dummy variable which is assigned the value of one if CEO is the chairperson and zero otherwise	Abor (2007), Mokarami et al (2012), Wellalage et al Locke (2012), Kaur & Singh (2021)
CEO Education	CEOedu	A dummy variable which is assigned the value of one if a CEO is a postgraduate, for instance, carries a master's and/or PhD degree and zero otherwise	Finkelstein and Hambrick (1996); Bertrand and Schoar (2003); Wang et al(2016); Kaur & Singh (2021).
CEO Gender	CEOgender	A dummy variable which is assigned the value of one if the firm is female owned and zero otherwise	Faccio et al (2016); Hudgens & Fatkin (1985); Johnson & Powell (1994), Kaur, R., & Singh, B. (2021).

(Source: Authors' Collection.)

#### 4. RESULTS AND DISCUSSION

Table 2 reports the overall observations, mean, standard deviation, minimum, and maximum values of financial variables included in the model. The mean investment value is 0.03 and 0.092 whereas Lang (1996) reported a value of 0.122, and Kumar et al (2019) reported 0.809. This outcome might be attributed to the fact that the majority of Vietnamese firms are small and medium-sized, that the life cycle of enterprises is not too long, and that comparable features and forms of investment capital are used, resulting in minimal volatility. The average value of LEV1 (long-term debt to total assets ratio) is relatively low at 0.060 and LEV2 is 0.208 (short-term debt to total assets), indicating that Vietnamese firms rely more on short-term debt.

**Table 2. Descriptive statistics of research data**

Variable	Obs	Mean	Std. dev.	Min	Max
INV1	3370	.030	.066	-.324	.372
INV2	3370	.092	.425	-6.345	1.011
LEV1	3370	.060	.097	0	.548
LEV2	3370	.208	.175	0	.735
CF	3370	.315	3.170	-26.920	30.642
TBQ	3370	1.108	.453	.395	3.943
ROA	3370	.103	.076	-.059	.417
LIQ	3370	2.072	1.839	.381	17.298
SIZE	3370	27.355	1.415	23.804	31.532
AGE	3370	15.999	7.399	1	61

(Source: Authors' Calculation on self-collected data.)

**Table 3. Descriptive statistics on CEO characteristics**

Variable	Obs	Mean	Std. dev.	Min	Max
CEOage	3370	49.230	7.971	24	78
CEOownership	3370	4.740	9.343	0	71.82
CEOgender	3370	.077	.268	0	1
CEOedu	3370	.289	.454	0	1
CEOdual	3370	.223	.416	0	1

(Source: Authors' Calculation on self-collected data.)

The young age group accounted for 3% while the middle age group accounted for 73% and the elderly group accounted for 24%. This result indicates that CEOs in Vietnam tend to be concentrated in the middle age group. The average CEO ownership ratio is 4.74, with a high ownership ratio of 72%, reflecting the concentration of ownership and share ownership in some organizations. Female CEOs only make up less than 10%, highlighting a significant gender disparity in corporate management. Executives who simultaneously serve as CEO and Chairman is not common. The percentage of CEO with a postgraduate degree is less than that of CEO qualifications with a university degree or less.

**The impact of financial leverage on firm’s investment**

According to the multicollinearity test results, the variance inflation factor (VIF) magnification coefficients are all less than 10, and the maximum VIF coefficient is 1.18, showing that the possibility of the phenomenon of multicollinearity is negligible. Because White’s test reveals that the model has heteroscedasticity, the OLS model is inapplicable. To choose the best model, we applied REM and FEM regression with the Hausman test (chi-square statistic = 70.67, P-value = 0.000), which shows the REM is inconsistent and inefficient, thereby FEM is more suitable at 1% level of significance.

The result of the FEM model (1) in Table 4 shows that financial leverage has a positive impact on investment decisions with a significance of 1%. This result rejects hypothesis  $H_1$  about the negative relationship between financial leverage and investment decisions. Our results show that firms with higher financial leverage are more likely to make new investments to expand their businesses. This is because financial leverage allows firms to increase their return on equity by using debt to finance their investments. By using debt, firms can reduce their tax liability and increase their earnings. Furthermore, financial leverage can also encourage higher investment levels while lowering financial risk, which in turn can lead to lower costs of bond financing (Hite, 1977). This result is consistent with the findings of studies conducted by Franklin & Muthusamy (2011), Trang & Quyen (2013), Ngoc et al (2019), Nguyen & Dong (2016).

**Table 4. CEO’s characteristics, leverage and investment decisions**

INV1	(1)	(2)
LEV1	.2031*** (.0231)	1.948*** (.4447)
CF	-.0001 (.0004)	-.0000 (.0004)
TBQ	.0137** (.0045)	.0136*** (.0045)
ROA	-.0092 (.0275)	-.0118 (.0275)
LIQ	-.0026** (.0011)	-.0030 (.0274)
SIZE	.0042 (.0038)	.0048*** (.0037)
AGE	-.0286*** (.0057)	-.0255*** (.0058)
LEV1xCEOownership		.0057** (.0023)

LEV1xCEOage		-0.4450*** (.1146)
LEV1xCEOdual		-0.0463 (.0344)
LEV1xCEOgender		-0.0990 (.0641)
LEV1xCEOedu		-0.0657** (.0361)
_cons	-0.0295 (.0948)	-0.0630 (.1061)
Observations	3370	3370
(*), (**), (***) represent for the significant level at 1%, 5% and 10%, respectively.		

(Source: Authors' Calculation)

*Note:**Table 4 presents output of fixed effects models (FEM)**Values reported in parentheses ( ) are the robust standard errors (SE);**(1) Regression model applied to investigate the effect of financial leverage on the firm's investment.**(2) Regression model applied to investigate the impact of CEO's characteristics on the relationship between financial leverage and firm's investment.*

Aside from the effect of financial leverage on investment, additional control variables in the model also have a certain influence on the dependent variable. The firm size and the growth opportunities have a positive impact, while the firm age has the negative effect, the factors of cash flow, liquidity, and return on assets have not yet had a significant impact on investment decisions. Specifically, the growth opportunities as measured by Tobin's Q is positively associated with investment decisions at the 5% significance level. This result is also consistent with the results of Gomes (2001), Aivazian et al (2005) and Li et al (2010). Firm size has a positive impact on investment decisions in the FEM regression, but not statistically significant. This implies that the size of the firm has no important role in the firm's investment decisions. This result is consistent with the findings of Kumar (2010), and Ruiz-Porras and Lopez-Mateo (2011). The firm age has a negative impact on the investment decisions. The younger companies create more investment opportunities (Adelino, Ma, & Robinson, 2017; Kaur & Singh, 2021). It can be explained that since long-established companies in the sector are in a period of stability and saturation in the market, their objective is to focus on preserving. Moreover, companies with a long history of operation often already have loyal customers and a varied product portfolio, so instead of focusing on product or service expansion, the firm may focus on protecting profits by optimizing operations and decreasing expenses. ROA and investment decisions have a negative association, which is not statistically significant. Our results are consistent with Nga et al (2018). This result contradicts prior research by Odit and Chittoo (2008), Trang and Quyen (2013). Liquidity has a negative impact on firms investment at the 1% significant level. This implies that when the LIQ increases, the firms' investment decisions decrease. This result is similar to the study of Kale and Noe (1990) on US firms and Zou and Xiao's (2006) which showed that high liquidity can lead to wasted cash and reduce investment productivity.

### **The impact of financial leverage on firm's investment: the moderation role of manager's characteristics (CEO)**

The results of the model (2) in Table 4 examined the impact of CEO's characteristics on the link between leverage and firm's investment, particularly share ownership, age, and education level of CEO have an impact on the positive relationship between leverage and investment. In specific, the positive effect of leverage on investment will be enhanced for firms whose CEO controls a large percentage of share ownership. Meanwhile, CEO's age and education level reduce the positive impact of financial leverage and investment. The characteristics of CEO's duality and CEO's gender have not found an impact on this relationship.

The result displays that the interaction variable between leverage and CEO shares ownership (LEVxCEOownership) is positive and statistically significant at 5%. This conclusion is contrary to hypothesis  $H_5$  that the CEO share ownership has a negative impact on the link between financial leverage and investment decisions. The positive effect of leverage on investment is stronger for companies where the CEO has a high percentage of share ownership. It implies that increasing ownership will enhance the impact of financial leverage on investment. This can be explained by the fact that when CEOs own a large portion of a company's stock, they can have greater motivation and influence over the company's investment decisions. Specifically, they have a financial interest in investing and seeking profits. Therefore, they tend to focus more on investment projects that are likely to yield higher returns. The result is consistent with the findings of Jensen and Meckling (1976), Berger et al (1977).

The interaction variable between leverage and CEO's age (LEVxCEOage) has a negative association at the 1% significant level. This result supports hypothesis  $H_4$  that CEO's age has a negative impact on the link between financial leverage and investment decisions. Because younger CEO will decide to use leverage to invest more. This can be explained by younger CEO's ambition to succeed in their career, which drives them to make stronger and more risky decisions than older CEO. As a result, young CEO are more motivated to innovate and invest than to maintain medium, stable, and long-term growth. This is consistent with the findings of Hambrick and Mason (1984), Margarethe and Bantel (1992), and Li et al (2014).

The interaction variable between leverage and CEO's education (LEVxCEOedu) has a negative association with a significance of 5%. This result negates hypothesis  $H_2$  that the education level of the CEO has a positive impact on the link between financial leverage and investment decisions. To explain this, CEO with a high degree of education will have a cautious and measured perspective of the market and will not make bold decisions, thereby reducing the ability to use leverage in investments. Our finding is contrary to the results of many prior studies such as Finkelstein and Hambrick (1996), Bertrand, who proposed that the education level of CEOs is related to the ability to finance more debt due to the risk-taking attitude of higher-educated CEOs.

The interactive variable between leverage and CEO's duality (LEVxCEOdual) is negative, but not statistically significant. This finding is consistent with Sheikh and Wang (2012), Kaur and Singh (2021).

The interactive variable between leverage and CEO's gender (LEVxCEOgender) has a negative coefficient, but not statistically significant. Our result is consistent with the result of Kaur and Singh (2021).

### **The impact of financial leverage on firm's investment: the effect of lagged leverage**

The regression results of the lagged variable model (3) and (4) in Table 5 show that financial leverage in the previous period has a positive impact on the current period investment, at a significance level of 1%.

Our result is similar to Navissi and Sajad (2016). When debt of the previous period increases, the enterprise can use this money to invest in the next period that helps to increase the ability to invest and generate profits. Moreover, with stable interest rates of long-term debt, businesses can make specific plans for investment decisions in the coming periods. This result supports our suggestion proposed in the research model section, the selection of the lagged variable model confirms the existence of the lagged impact of leverage on investment decisions.

**Table 5. The effect of one lagged period leverage**

Models	(3)	(4)
LEV1 <sub>t-1</sub>	.2175*** (.0316)	1.8093*** (.6265)
CF <sub>t-1</sub>	-.0004 (.0005)	-.0003 (.0005)
TBQ <sub>t-1</sub>	.0008 (.0057)	.0008 (.0057)
ROA <sub>t-1</sub>	.0934*** (.0355)	.0896** (.0355)
LIQ <sub>t-1</sub>	-.0007 (.0015)	-.0009 (.0014)
SIZE <sub>t-1</sub>	.0175*** (.0053)	.0183*** (.0054)
AGE <sub>t-1</sub>	-.0377*** (.0082)	-.0349*** (.0083)
LEV1xCEOownership <sub>t-1</sub>		.0042 (.0028)
LEV1xCEOage <sub>t-1</sub>		-.4073** (.1626)
LEV1xCEOdual <sub>t-1</sub>		.0019 .0430
LEV1xCEOgender <sub>t-1</sub>		-.1972 .0830
LEV1xCEOedu <sub>t-1</sub>		-.1379*** .0474
_cons	-.3643*** (.1349)	-.4150*** .1485
Observations	3370	3370

(\*), (\*\*), (\*\*\*) represent for the significant level at 1%, 5% and 10%, respectively.

Note:

Table 5 presents output of fixed effects models (FEM);

(3) The regression model applied to investigate the effect of financial leverage on the firm's investment and the lagged effect of long-term debt;

(4) Regression model applied to investigate the effect of financial leverage on the firm's investment: the effect of CEO's characteristics and the lagged effect of leverage.

(Source: Authors' Calculation on self-collected data.)

**Robustness tests**

To test the robustness of the research model, we use another measure of financial leverage and another measure of investment decisions. Table 6 shows that the correlation between financial leverage and investment decisions are still positive when using the investment variable with a different measure (INV2) but still using long-term debt to quantify leverage (LEV1), this result is consistent with the results obtained when using the model (1), thus ensuring the robustness of the research model.

**Table 6. Robustness tests**

Dependent variable	LEV1 (Long-term debt/Total Assets)			LEV2 (Total Debt/ Total Assets)		
	OLS	REM	FEM	OLS	REM	FEM
INV1	.1432*** (.0122)	.1531*** (.0132)	.2031*** (.0231)	-.0328*** (-.0489)	-.0450*** (.0079)	-.1277*** (.0156)
Observation	3370	3370	3370	3370	3370	3370
VIF	1.18			1.21		
Imtest White	***			***		
Hausman test	***			***		
INV2	.0721 (.0818)	.0721 (.0818)	.3042** (.1634)	-.2107*** (.0479)	-.2107*** (.0479)	-.7052*** (.0994)
Observation	3370	3370	3370	3370	3370	3370
VIF	1.18			1.21		
Imtest White	***			***		
Hausman test	**			***		

(\*), (\*\*), (\*\*\*) represent for the significant level at 1%, 5% and 10%, respectively.

Note:

LEV1 is the financial leverage measurement variable used in the main results in table 4 and table 5;

INV1 is the investment decisions measurement variable used in the main results in table 4 and table 5;

LEV2 is a new financial leverage measurement variable included to test the robustness;

INV2 is a new investment decisions measurement variable included to test the robustness.

(Source: Authors' calculation on self-collected data.)

Besides, when we measure financial leverage by total debt to total assets (LEV2), we find that financial leverage has a negative impact on investment decisions for both measures of investment decisions (INV1, INV2) at 1% significance level. This result is also consistent with previous studies by Jensen and Meckling (1976), Aivazian et al (2005a), Firth et al (2008), Nguyet et al (2014), Ngoc et al (2019), Cevik et al (2020). As mentioned in the research review, these studies support the theory of the investment constraining effect of debt due to agency problems. Debt creates pressure on using cash flow to pay interest and loan capital will reduce the benefits of managers (in terms of salary, reputation,...). Therefore, to protect their current position and income, managers will find ways to avoid or minimize the use of financial leverage in the company's investment activities. In addition, stemming from the fact that the short-term debt of Vietnamese enterprises accounts for a relatively large proportion (64% of the total number of observations have the ratio of short-term debt greater than long-term debt). Although short-term debt has a low-interest rate, there is uncertainty about the supply of subsequent loans. As a result, using too much short-term debt in total debt will cause certain difficulties in long-term investment decisions.



## 5. CONCLUSION

This paper extended earlier empirical studies on the relationship between financial leverage and investment decisions in Vietnamese listed companies. With a dataset of 564 firms from 2008 to 2021, we found that financial leverage is positively related to investment decisions. The robustness of this result is verified by an alternative definition of firm investment. Also, the regression model with lagged independent variables highlighted there is an existence of long-term effects of leverage on investment decisions.

Unlike previous studies, we investigated the impact of CEO's characteristics on the relationship between financial leverage and investment decisions. We found that the positive impact of financial leverage on investment decisions is reduced when the age and the education level of the CEO are higher. Meanwhile, the positive effect of leverage on investment will be stronger for businesses with CEOs who own a high percentage of the stock. The attributes of CEO's duality and CEO's gender have no effect on this relationship.

Our results inferred some implications. The managers can consider using a suitable level of financial leverage to expand their enterprise. However, they need to consider the maturity of the debt and compare the level of suitability with the loan purpose as well as the firm's cash flow to pay the debt obligation, avoiding the situation of short-term loans to implement long-term financing projects. Furthermore, these findings will be useful for shareholders to make decisions on selecting the suitable manager for the firm. If being risks seeking to take more opportunities, shareholders should choose CEOs who are young and have a college degree or less, they will take on more risk in investing. Besides, shareholders also consider CEO's share ownership rate, a high CEO ownership rate indicates that CEO's benefits are tied to the firm, so the CEO will consider the company's investment choices.

To conclude, this study provides new insights into the leverage–investment relationship and the role of CEO's characteristics. Due to insufficient data on internal information of the companies, many observations were excluded which may affects the reliability of the results. It will be useful to extend this research to test how this relationship matters across industrial lines and using more estimated methods for robustness check. This is something new that could be looked at in future research.

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## EVALUATING THE EFFECTIVENESS OF ETFS IN VIETNAM BY THE MISPRICING AND VALUE AT RISK

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**ABSTRACT:** *The research article aimed to evaluate the efficiency of 10 ETF funds in Vietnam from January 2018 to early November 2022. Firstly, based on Beta, Alpha, Sharpe and Treynor ratio, the study evaluates the efficiency of the ETFs and finds two outstanding funds: FUEVFN30 and FUESSVFL. Then, conducting the ARX-GARCH model showed the impacts affecting the mispricing of ETFs. The E1VFN30, FUESSV50, and FUEMAV30 funds are overpriced. In addition, the GARCH-t and GJR-GARCHt models are used to estimate the VaR, indicating that the mispriced funds (E1VFN30, FUESSV50, and FUEMAV30) have a minimal loss rate when the market experiences bad events which are higher than other ETFs. After that, the researchers used the Backtesting method to test and choose the GJR-GARCHt model to estimate VaR more accurately and reasonably. Finally, through the evaluations and VaR, the study proposed an investment portfolio, including FUEVFN30 and FUESSVFL funds with the proportion being 13.74% and 86.26%, respectively.*

**Keywords:** *ETF, VaR, ARX-GARCH, GARCH-t, GJR - GARCHt, Backtesting.*

### INTRODUCTION

Since the 1990s up until now, ETFs have become one of the most popular passive investment platforms among professional investors. In Vietnam's market, (Anh & Huong, 2021) used the Sharpe ratio to evaluate the effectiveness of investment portfolios of investment funds. The research team believes that ETFs are a new and urgent research area for the nascent investment environment that the world is paying attention to.

Value at Risk is the maximum loss amount in a certain period of time, if the worst cases are excluded. This index was born after the Sharpe, Treynor, and Jensen indices, so its popularity is still not really high compared to its predecessors. VaR is applied to different financial instruments such as stocks, bonds, foreign currencies, and derivatives, as a statistical measure of portfolio risk based on the latest positions, taking into account portfolio diversification and leverage (Jorion, 2009). (Dowd, 1999) và (Tehrani, Mohammadi, S. M, & Nejadolhosseini, N. S, 2014) have both proposed investment decisions based on VaR. To estimate VaR, (Fuess, Kaiser, D. G., & Adams, Z., 2007) combined VaR with the GARCH model, and the result was that GARCH-type VaR performed better than other VaRs on most fund barrier indices. The authors have shown that GARCH-type VaR is a superior risk measure, especially for trading strategies that exhibit negative skewness, excess kurtosis, and provide daily prices. The VaR method will be an effective tool for measuring the potential risk of investment funds in the future. Therefore, in this study, the group will use the VaR measure to estimate market risk.

ETFs are a relatively new investment tool in the Vietnamese market, so data as well as scientific research are still limited. Therefore, the group believes that this is a new and urgent topic, so they have carried out the

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study: **“EVALUATING THE EFFECTIVENESS OF ETFs IN VIETNAM BY THE MISPRICING AND VALUE AT RISK”** The study uses data from 8 domestic funds and 2 foreign funds in the Vietnamese market between January 2018 and early November 2022 to evaluate the performance of the funds. The study will use 4 indices: (1) Sharpe ratio, (2) Beta, (3) Alpha, (4) Treynor ratio to preliminarily evaluate the performance of the funds. The focus of the study is the application of the ARX(p,q) - GARCH(r,s) model to evaluate the impacts affecting the mispricing of ETF (PD) with 5 endogenous variables including the VN-Index, Gold price, Oil price, trading volume and volatility. The general objective of this research is to evaluate the effectiveness of ETF funds in the Vietnamese market using the Value at Risk method. Based on the research findings, we propose an investment portfolio consisting of two ETF funds, FUEVFNVD and FUESSVFL, which have been considered to be the most optimal.

## 2. LITERATURE REVIEW

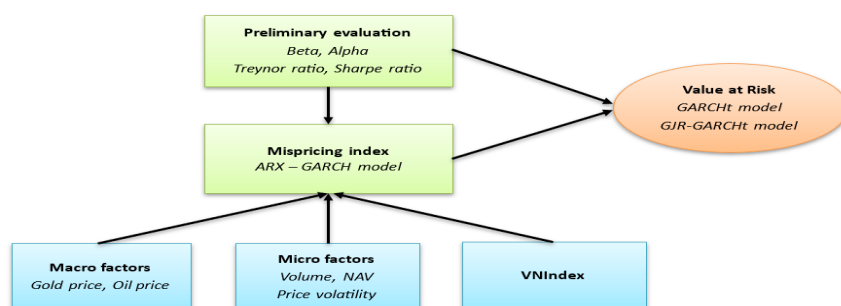
Exchange Traded Fund (ETF) is an investment fund that simulates the fluctuations of stock or bond indices, which are traded on stock exchanges. ETFs have become one of the most popular passive investment vehicles among retail and professional investors due to their low trading costs and high liquidity. Globally, the total asset scale of ETFs managed worldwide has increased significantly from 2009 to 2019, with an increase of nearly 400% to USD 11.4 trillion on November 19 in 2019, (MBS, 2020). Therefore, ETFs are becoming a trend worldwide and in Vietnam.

To evaluate the performance of investment funds, most previous studies have used tools such as the Sharpe ratio, Treynor ratio, Jensen’s Alpha. (Jayadev, 1996) used the Sharpe ratio, Treynor ratio, and Jensen’s Alpha to evaluate two growth-oriented mutual funds but the results of these ratios did not work well. According to the research of (Liang, 1999), using the Sharpe ratio, Treynor ratio, and Jensen’s index to evaluate the performance of South African stock investment funds, the results of Jensen’s index and Treynor ratio are used to make decisions and determine market timing for fund managers. (Povilas, 2014) attempts to introduce and compare the risk and performance ratios of Lithuanian mutual funds using the Alpha, Beta, Sharpe, and Treynor ratios. The research paper by (Stefanus & Robiyanto, R, 2020) examines ETF funds from 2018-2019 using indicators such as the Treynor. (Vardhini RN & Naupal Reddy, 2020) demonstrates that the Sharpe performance measure, Treynor Ratio, and Jensen measure help investors make effective decisions, but the research is limited by the relatively small number of observed variables due to the newness of the ETF market in various countries. Another study by (Sumit, 2019) uses indicators including Return, Risk, Sharpe Ratio, Beta, Jensen’s Alpha to analyze the annual profit. It shows that ETF funds generate the highest profits over a 5-year period, even during market downturns, and perform better than index funds.

Value at Risk is the maximum amount of potential loss at certain intervals, after excluding the worst-case scenarios. VaR is a relatively new risk measurement tool, and its popularity is not yet widespread. Combining VaR with other risk measures can help evaluate investment portfolios or simply describe the potential loss that could occur within an investment portfolio (Linsmeier & Pearson, N. D., 2000). (Alexander & Baptista, A. M., 2002) has indicated that portfolio managers can use mean-VaR to select investment portfolios instead of the traditional average variance. The research by (Tehrani, Mohammadi, S. M., & Nejadolhosseini, N. S., 2014) used VaR value estimation through the GARCH (1,1) model and the Monte Carlo estimation method, while conducting a model test using the Kupiec test method to increase confidence in the model. The study also used the adjusted Sharpe ratio to evaluate the efficiency of ETFs in Iran. The conclusion of the research shows that both VaR calculation methods using GARCH and Monte

Carlo are reliable - a good alternative for calculating VaR and making investment decisions. (Ali, M. Raza, & N. Zaman, 2021) examined the impact of macroeconomic indicators such as interest rates, inflation, and GDP on the VaR of US equity ETFs using MPT and EMH. The Modern Portfolio Theory is a theory aimed at maximizing investment portfolios to maximize expected returns with a certain level of risk, and risk is a necessary trade-off to achieve higher profits. It was developed by Harry Markowitz in the early 1952s and has been widely used by investors and fund managers (Thào, 2019). The efficient market hypothesis states that stocks are always traded at fair values in the stock market. Fama (1970) stated, “A market in which prices always fully reflect available information is called an efficient market.” Malkiel (1992) argued that a capital market is considered efficient if it fully and accurately reflects all relevant information in determining stock prices (Lan, 2019). The authors found that economic indicators significantly impact the VaR of ETFs, and their findings have implications for risk management strategies. Another study by [ (Bouzouita, A. Karoui, & M. B. Ghorbel, 2021) investigates the relationship between market volatility and ETF profitability in emerging markets using MPT and EMH. The authors found that market volatility has a significant impact on ETF profitability, and they suggest investors consider this factor when making investment decisions.

Most research studies focus only on the performance of funds without considering their risk levels. Therefore, we use not only commonly used ratios such as Beta, Alpha, Treynor, and Sharpe to assess the historical performance of funds but also GARCH-t and GJR-GARCHt models to estimate Value at Risk to effectively measure risk. Additionally, we use Backtesting to select the best VaR measurement model.



**Figure 1. Research framework**

### 3. METHODOLOGY

#### 3.1 Preliminary evaluation method

Investors utilize various methods to evaluate the performance of a portfolio. Monitoring the year-to-year returns of the portfolio is a common practice. However, when attracting potential investors, simply presenting trend analysis is insufficient. Investors typically seek a comparative assessment of portfolio performance against other portfolios, different asset classes, or the overall market. According to the studies of (Samuel Anbu Selvan S.C.B & Ram Raj G, 2021) and (Sathish Kumar and Ram Raj, 2019) the research team will use the following indices for this study. These ratios provide investors with a sense of confidence regarding how the portfolio performed in relation to the market or other assets.

##### 3.1.1 Beta

Beta is a measure of systematic risk of a security or an investment portfolio relative to the overall market:

$\beta = \frac{Cov(R_i, R_m)}{Var(R_m)}$  ; If an investor wants to invest with a higher Beta, they must accept higher risk.

### 3.1.2. Alpha

The Alpha is an indicator used to evaluate the effectiveness of an investment fund relative to the market index:

$$\alpha = R_p - [R_f + (R_m - R_f) * \beta]$$

If the Alpha is positive, it indicates that the fund has achieved higher returns than the expected return based on the level of risk and vice versa.

### 3.1.3 Treynor ratio

The Treynor ratio is a measure of the return earned by an investment compared to the systematic risk taken. The higher the Treynor ratio, the better the investment performance.

$$\text{Treynor} = \frac{R_p - R_f}{\beta}$$

### 3.1.4 Sharpe ratio

The Sharpe ratio is a measure of how much return an investment generates per unit of risk taken when investing in an asset or following a trading strategy. The higher the Sharpe ratio, the more likely the investment is considered to generate higher returns for the risk taken.

$$\text{Sharpe} = \frac{R_p - R_f}{\sigma_p}$$

The aforementioned coefficients are all important indicators in evaluating the efficiency of an investment portfolio, but they can also be influenced by various factors. Therefore, it is necessary to exercise caution and combine them with other indicators to comprehensively assess the effectiveness of the investment portfolio.

## 3.2 Evaluating using model

### 3.2.1 ARX – GARCH model

The Autoregressive model with exogenous variables and Generalized autoregressive conditional heteroskedasticity model is represented by the ARX(p, q<sub>1</sub>, q<sub>2</sub>,...q<sub>k</sub>) - GARCH(r,s) model:

$$Y_t = \sum_{i=1}^p \phi_i y_{t-i} + \sum_{i=1}^k \sum_{j=1}^{q_i} \psi_{ij} x_{it-j} + a_t,$$

$$|a_t = e_t \sqrt{h_t} ; h_t = \alpha_0 + \sum_{i=1}^s \alpha_i a_{t-i}^2 + \sum_{j=1}^r \beta_j h_{t-j}$$

where: x<sub>1t</sub>, x<sub>2t</sub>,...,x<sub>kt</sub> : are the exogenous variables included in the model; e<sub>t</sub> : is a sequence of random variables following a normal distribution N(0,1).

To ensure that the right-hand side of the variance equation for is always positive and satisfies the conditions on the covariance in the study of (Mike K. P. So, Cathy W. S. Chen and Feng-Chi Liu, 2022), we need to have the following conditions:

$$\alpha_0 > 0, \alpha_i, \beta_i \geq 0 \text{ and } \sum_{i=1}^s \alpha_i + \sum_{j=1}^r \beta_j < 1$$

According to the study of (Mike K. P. So, Cathy W. S. Chen and Feng-Chi Liu, 2022), the ARX-GARCH model is very useful for analyzing the time series profit of the market. This result is consistent with the study of (Baillie, R. T., Bollerslev, T. and Mikkelsen, H. O., 1996) for the S&P 500 index. The profit of the SE300 index has an AR(3) form in the study of (Karolyi, 1995), based on the Akaike information criterion (AIC), which also shows that the ARX-GARCH model is optimal for forecasting profit with the impact of exogenous variables.

### 3.2.2 Value at Risk - VaR using the GARCH-t model:

The GARCH model has the advantage of capturing the time-varying volatility of financial time series, which can be updated regularly to reflect changes in market conditions and is a common method for estimating VaR. (PHUỐC, TOÀN, N. V., & THÀNH, V. B., 2017) in their research that the GARCH(1,1) model can be used to forecast VaR through testing the impact of structural breaks. Building on previous authors, a study by (Füss, Dieter G Kaiser, & Zeno Adams, 2007) asserted computed and measured VaR using three methods, including Historical Simulation, Conditional Autoregressive Value at Risk, and GARCH. The GARCH model was used to estimate income rate volatility based on probability distributions. Other studies by (Bollerslev, 1986); Huang and Lin, 2004; So and Yu, 2006, and others) have used heavy-tailed distributions.

GARCH (p,q) model has the following form:

$$\sigma_t^2 = \omega + \sum_{i=1}^p \alpha_i \varepsilon_{t-i}^2 + \sum_{j=1}^q \beta_j \sigma_{t-j}^2$$

Value at Risk according to GARCHt:

$$\widehat{VaR}_{t+1}^q = -\widehat{\sigma}_{PF,t+1} t_v^{-1}(q) \sqrt{\frac{v}{v-2}}$$

### 3.2.3 Value at Risk – VaR using the GJR-GARCHt model

The study by (Mostafa, Pritam Saha, Mohammad Rafiqul Islam, & Nguyet Nguyen, 2021); (Duan & Jung-Chu Lin) proposed that for non-normally distributed data, the GJR-GARCH model with a t-student distribution can be applied as a risk measurement tool to counter the market uncertainty of unstable ETFs. The studies by (Mostafa, Pritam Saha, Mohammad Rafiqul Islam, & Nguyet Nguyen, 2021); (Duan & Jung-Chu Lin) all concluded that the GJR-GARCH model provides better and superior estimates for the volatility of returns compared to the GARCH model.

The GJR-GARCH (Glosten, Jagannathan, and Runkle - GARCH) is an extension of the GARCH model that adds asymmetry to address the leverage effect in predicting asset price volatility, developed by (Robert F. Engle, Emil N. Siriwardane, 2018). This model provides risk forecasts for financial assets, thereby supporting risk management for investors and investment funds. The GJR-GARCH (p, q) model has the form:

$$\sigma_t^2 = \omega + \sum_{i=1}^p \alpha_i \varepsilon_{t-i}^2 + \sum_{j=1}^q \beta_j \sigma_{t-j}^2 + \sum_{k=1}^p \gamma_k I_{t-k}^2 \varepsilon_{t-k}^2;$$

With  $I_{t-i} = 1$  if  $\varepsilon_{t-i} < 0$  and  $I_{t-i} = 0$  if  $\varepsilon_{t-i} \geq 0$

Value at Risk according to GJR – GARCHt:  $\widehat{VaR}_{t+1}^q = -\widehat{\sigma}_{PF,t+1} t_v^{-1}(q) \sqrt{\frac{v}{v-2}}$

The research of (Hò Thủy Tiên, 2017) applies the GJR-GARCH model to test the impact of structural breaks, showing that incorporating structural breaks into the GJR-GARCH model can be used for VaR forecasting.

### 3.3 VaR – Backtesting test

Backtesting Value at Risk is crucial because it helps validate the accuracy and reliability of VaR models in estimating and managing portfolio risk. By Backtesting VaR, historical data can be used to assess how well the VaR model predicted actual portfolio losses during past market conditions. This allows for the evaluation of the model’s performance and provides insights into its strengths and weaknesses. It helps identify any deficiencies or biases in the model’s assumptions and calculations. It is a critical step in the risk management process and aids in making informed investment decisions.

There are various methods of measuring VaR and each method has its own limitations, so it is important to have proper evaluation methods to assess the quality of the calculated risk values. The idea behind this test is to examine each VaR value compared to the Profitability rate, defined as follows:

$I_t(\tau) = \{1 \text{ if } r_t < -VaR(\tau) \text{ 0 if } r_t \geq -VaR(\tau) \}$  ; where:  $I_t(\tau)$ : Contains a value of 0 or 1;  $r_t$ : return rate.

#### 3.3.1 Unconditional coverage test - POF test

VaR-Backtesting is a commonly used method to test the accuracy of the VaR model, a financial risk measurement method that includes checking whether actual losses are consistent with expected losses. The most widely known experiment is based on the failure rate proposed by Kupiec (1995). Kupiec’s experiment, or POF-test (proportion of failures), measures whether the number of outliers is suitable for the level of confidence. This testing method has the advantage of being suitable for the distribution model of gaps in reality, without necessarily assuming that gaps follow a normal or similar distribution.

$$\text{Hypothesis: } \begin{cases} H_0: p = \hat{p} = \frac{x}{T} \\ H_1: p \neq \hat{p} \end{cases}$$

where: T is the number of observations; x is the number of expectations.  $\hat{p}$  is the exceedance probability. The idea is to find out whether the observed failure rate  $\hat{p}$  is significantly different from p, the failure rate suggested by the confidence level.

According to Kupeic (1995), the POF-test is best performed as a likelihood-ratio test. The test statistic takes the form:  $LR_{POF} = -2\ln\left(\frac{(1-p)^{T-x} p^x}{[1-\hat{p}]^{T-x} \hat{p}^x}\right)$

$LR_{POF}$  follows a Chi-square ( $\chi^2$ ) distribution with 1 degree of freedom. If the test statistic  $LR_{POF} >$  the critical value of the  $\chi^2$  distribution, then  $H_0$  is rejected- the model is inaccurate and vice versa.

#### 3.3.2 Conditional coverage test - Mixed Kupiec test

(Haas, 2001) introduced a new improved testing method by combining the ideas of Christoffersen and Kupiec, called the Mixed Kupiec test. In (Nieppola, 2009) study, multiple methods were used simultaneously to perform VaR tests, and the results indicated that the Mixed Kupiec test was the best solution as it is able to capture more general forms of dependence.



According to (Haas, 2001), Kupiec's TUFF test, time until first failure test, can be used to evaluate the time between two threshold crossings. The statistical test for each threshold crossing is as follows:  $LR_i = -2\ln\left(\frac{p(1-p)^{v_i-1}}{\left(\frac{1}{v_i}\right)\left(1-\frac{1}{v_i}\right)^{v_i-1}}\right)$ ; where:  $v_i$  the time between two threshold crossings  $i$  và  $i-1$

After computing the LR test statistics for each threshold crossing, a test of independence is obtained where the null hypothesis is that there is no dependence between the threshold crossings and the fitted model. With  $n$  as the number of threshold crossings, the statistical test for independence is given by:

$$LR_{ind} = \sum_{i=2}^n \left[ -2\ln\left(\frac{p(1-p)^{v_i-1}}{\left(\frac{1}{v_i}\right)\left(1-\frac{1}{v_i}\right)^{v_i-1}}\right) \right] - 2\ln\left(\frac{p(1-p)^{v_i-1}}{\left(\frac{1}{v_i}\right)\left(1-\frac{1}{v_i}\right)^{v_i-1}}\right)$$

Mixed Kupiec test:  $LR_{mix} = LR_{POF} + LR_{ind}$

$LR_{mix}$  follows  $\chi^2$  distribution with  $n + 1$  degrees of freedom. If the test statistic  $LR_{mix} >$  the critical value of the  $\chi^2$  distribution, then  $H_0$  is rejected - the model is inaccurate and vice versa.

#### 4. DATA AND PRELIMINARY EVALUATION RESULTS

##### 4.1 Data

- Data: 10 ETF in Vietnam, including 2 foreign funds and 8 domestic funds
- Dependent variable: The mispricing of 6 domestic ETF funds, including E1VFN30, FUESSV30, FUESSVFL, FUESSV50, FUEMAV30, and FUEVFN30.
- Independent variables: Daily closing the VNIndex, gold price, oil price, trading volume, NAV and daily price volatility of ETFs.
- Independent variables: According to research by (Nguyen, Nguyen, T. T. N., & Nguyen, T. T. M., 2021) has found that macro factors such as crude oil price, gold price have a positive influence on the evaluation of ETFs. Another study by (Rahmanto & Wibowo, B., 2021) and (Lucy F. Ackert & Yisong S. Tian, 2008) found that trading volume has a negative effect on the mispricing of ETFs based on NAV value. By contrast, the study of (Gunduz Caginalp & Mark DeSantis, 2017) also shows that the price movement of ETFs positively affects the evaluation of ETFs. In addition, ETFs in Vietnam are stock index ETFs modeled after baskets of securities on the Vietnamese stock exchange, so the Vietnam Stock Market Index (VNINDEX) will have an impact on ETF evaluation. Besides, the study of (Ching-Chung Lin, Shih-Ju Chan & Hsinan Hsu, 2006) shows NAV (Net Asset Value) positive effect on the mispricing of ETF. Independent variables used in studies are collected from Investing, concluding:

1. Daily closing VNIndex
2. gold price
3. oil price
4. trading volume
5. NAV of ETFs
6. daily price volatility of ETFs

- Timeframe: From January 2018 to early November 2022.

4.2 Preliminary assessment

Table 1. Preliminary assessment result

	Beta	Rank Beta	Alpha	Rank Alpha	Treynor	Rank Treynor	Sharpe	Rank Sharpe	Average rank
E1VFN30	0.93248	1	0.0000254	7	0.046689	8	0.055912	7	5
FUESSV30	0.59471	8	0.0001985	3	0.272644	2	0.390757	3	2
FUESSVFL	0.75694	5	0.0002562	2	0.233847	3	0.420886	2	2
FUESSV50	0.07341	10	0.0001613	4	0.065901	6	0.073409	6	4
FUEMAV30	0.89556	3	0.0001314	5	0.064014	7	0.103924	5	4
FUEVN100	0.62443	7	0.0000147	8	0.108499	4	0.125355	4	3
FUEIP100	0.87198	4	-0.0010285	10	-0.561543	10	-2.162933	10	6
FUEVFNVD	0.92317	2	0.0009888	1	0.379334	1	1.127440	1	1
FM	0.70636	6	-0.0001895	9	-0.064366	9	-0.294228	9	6
FTSE	0.19842	9	0.0000604	6	0.079847	5	-0.076439	8	4

Source: Authors' Calculation

When the Beta is close to 1, it is better because the fund's volatility is equal to that of the market. A positive Alpha is preferable as it indicates that the fund achieves higher profits than expected based on its risk level. Similarly, higher values for the Treynor and Sharpe ratios are better. As a result, FUEVFNVD and FUESSVFL are the two funds with the best evaluation results. Investors may consider investing in them, but they should also take into account other factors that may affect efficiency, such as the fund's cash flow, the companies in the index basket, and the management capabilities of fund managers.

4.3 The ARX (p,q)- GARCH (r,s) model results

$$PD_{f,t} = \left| \frac{P_{f,t} - NAV_{f,t}}{NAV_{f,t}} \right|$$

where:  $PD_{f,t}$ : The value of ETF f mispricing at the time t;  $P_{f,t}$ : The closing price of ETF f at the time;

$NAV_{f,t}$ : The Net Asset Value of ETF f at the time t

ARX Model:

$$PD_{f,t} = \alpha_f + \beta_{f1} * PD_{f,t-1} + \beta_{f2} * PD_{f,t-2} + \beta_{f3} * D(NAV_{f,t}) + \beta_{f4} * D(Goldprice_t) + \beta_{f5} * D(Oilprice_t) + \beta_{f6} * D(VNINDEX_t) + \beta_{f7} * Vlttycc_{f,t} + \beta_{f8} * Volume_{f,t} + \beta_{f9} * Volume_{f,t-1} + \beta_{fi} * X_{f,t} + \beta_{fi} * Y_{f,t} + a_t$$

where:  $Goldprice_t$ : Logarit of Gold price at time t;  $Oilprice_t$ : Logarit of Oil price at time t;  $VNINDEX_t$ : Logarit of VINDEX at time t;  $Vlttycc_{f,t}$ : Volatility of trading price of at ETF f at time t;  $Volume_{f,t}$ : Logarit of the transaction volume of ETF f at time t;  $X_{f,t}$ : Separate variables of ETF f at time t;  $Y_{f,t}$ : Breakpoints of ETF f at time t.

**Condition:**  $a_t = e_t \sqrt{h_t}$  and  $h_t = \alpha_0 + \sum_{i=1}^s \alpha_i a_{t-i}^2 + \sum_{j=1}^r \beta_j h_{t-j}$  ( $\alpha_0 > 0, \alpha_i, \beta_i \geq 0$ )

**Table 2. Variable expectations in the model**

Independent variables	Research papers	Expectation
Volatility of trading price	(Gunduz Caginalp & Mark DeSantis, 2017)	(+)
NAV (Net Asset Value)	(Ching-Chung Lin, Shih-Ju Chan & Hsinan Hsu, 2006)	(+)
Trading volume	(Rahmanto & Wibowo, B., 2021)	(-)
	(Lucy F. Ackert & Yisong S. Tian, 2008)	
The Stock Index	(Rahmanto & Wibowo, B., 2021)	(-)
Gold Price	(Nguyen, Nguyen, T. T. N., & Nguyen, T. T. M., 2021)	(+)
Crude Oil	(Nguyen, Nguyen, T. T. N., & Nguyen, T. T. M., 2021)	(+)

Source: Authors' Calculation

**Table 3. Main variables Result**

Variables	E1VFN30	FUESSV30	FUESSVFL	FUESSV50	FUEMAV30	FUEVFVND
	0.15512 (***)	0.23249 (***)	0.35585 (***)	0.30040 (***)	-0.08529 (**)	1.12842 (***)
	-	-	-	0.10632 (***)	-	-
<i>D()</i>	0.40164 (***)	-0.42367 (***)	-0.32145 (***)	-0.76069 (***)	0.11349 (*)	-0.29236 (***)
	0.05352 (*)	-0.04077	0.06318	0.14637 (**)	-0.10162	0.04071
<i>D()</i>	0.00007	-0.00011	-0.00009	-0.00012	0.00009	0.00002
<i>D()</i>	-0.74441 (***)	-0.34449 (***)	0.23166 (*)	0.16232 (***)	-0.25027 (***)	0.20921 (**)
	0.00003 (***)	0.00065 (***)	0.00009 (***)	-0.00033 (***)	0.00044 (***)	0.00032 (***)
	0.00082 (***)	0.00218 (***)	0.00109 (**)	-0.00010	0.00103 (**)	0.00139 (**)
<i>RESID(-1)^2</i>	0.35340 (***)	0.31659 (***)	0.57464 (***)	0.06669 (***)	0.05799 (***)	0.41725 (***)
<i>RESID(-2)^2</i>	-0.25691 (***)	0.41228 (***)	-0.49451 (***)	-	-	-
<i>GARCH(-1)</i>	0.77243 (***)	-	0.91250 (***)	0.92732 (***)	0.91504 (***)	-
<i>R-squared</i>	0.35518	0.64277	0.50539	0.89594	0.60295	0.49935

Note: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ 

Source: Authors' Calculation

The result's five of six funds show significant positive correlation between dependent variable and the one-lag mispricing. This indicates that investors mispriced the value of the funds in the past, they can make wrong decisions in the future. The mispricing of most ETFs has negative correlation with the first difference

in their NAV, including FUESSV30, FUESSVFL, FUESSV50, and FUEVFN30. This result shows that if these ETF are operating well in the market, investors can evaluate ETFs potential and minimize mispricing based on NAV. By contrast, E1VFN30 and FUEMAV30 have opposite correlation, indicating that when the NAV increases, the mispricing of these ETFs also increases, meaning that investors have too high expectations, but the funds are not performing well.

The relation between the first difference in gold price and the dependent variable of E1VFN30 and FUESSV50 funds are significant positive. According to the study of [37], the gold price has a positive impact on the profit from ETFs. When the gold price rises, the expectation of the fund's profit can increase which may cause mistakes in valuing the fund. On the other hand, the first difference in oil price has a negative correlation with the dependent variable of most ETF funds but is not significant.

The mispricing of E1VFN30, FUESSV30, and FUEMAV30 funds has a negative correlation with the D(VNINDEX) variable, while the FUESSVFL, FUESSV50, and FUEVFN30 have the opposite relationship. E1VFN30, FUESSV30, and FUEMAV30 funds based on the VN30 index- representing the index of the 30 most capitalized and liquid stocks on HOSE, accounting for over 80% of the capitalization of VNINDEX. Therefore, based on the VNINDEX, investors can predict the fluctuations of E1VFN30, FUESSV30, and FUEMAV30 funds. Other ETF funds including FUESSVFL and FUEVFN30 have reference of VNFINLEAD and VN Diamond index - consist of stocks that have potential and good returns in the stock market. Therefore, investors will have high expectations for the value of these funds, leading to some mispricing about the real value of the ETF.

The trading volume and price volatility of most ETF funds are significantly positively correlated with dependent variables. This shows that when trading volume and price volatility increase, the mispricing of the fund will increase because investors may be influenced by market psychology and make wrong decisions. In addition, the trading volume of six ETF funds is quite limited, according to the study by (Gunduz Caginalp & Mark DeSantis, 2017) showing that when trading volume is small, market inefficiency will exist. Therefore, because ETFs in the Vietnamese market are still relatively new, the market is not yet efficient.

#### 4.4 The Value at Risk using the GARCH-t and GJR-GARCHt models

\* GARCH-t (1,1) model:

$$\sigma_t^2 = \omega + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2$$

\* GJR-GARCHt (1,1) model:

$$\sigma_t^2 = \omega + \alpha \varepsilon_{t-1}^2 + \beta \sigma_{t-1}^2 + \gamma I_{t-1} \varepsilon_{t-1}^2$$

With  $I_{t-1} = 1$  if  $\varepsilon_{t-1} < 0$  and  $I_{t-1} = 0$  if  $\varepsilon_{t-1} \geq 0$

\* VaR using the t-student distribution:

$$\widehat{VaR}_{t+1}^q = -\widehat{\sigma}_{PF,t+1} t_v^{-1}(q) \sqrt{\frac{v}{v-2}}$$

**Table 4. The loss ratio**

	90%		95%		99%	
	GARCHt	GJR GARCHt	GARCHt	GJR GARCHt	GARCHt	GJR GARCHt
<b>E1VFN30</b>	-6.35%	-6.10%	-8.12%	-7.86%	-12.33%	-12.02%
<b>FUESSV30</b>	-5.37%	-5.14%	-7.00%	-6.68%	-12.22%	-11.65%
<b>FUESSVFL</b>	-5.32%	-5.17%	-6.58%	-6.23%	-10.52%	-10.27%
<b>FUESSV50</b>	-5.62%	-5.70%	-8.38%	-8.49%	-17.24%	-17.43%
<b>FUEMAV30</b>	-6.18%	-5.93%	-7.80%	-7.48%	-12.39%	-11.86%
<b>FUEVN100</b>	-5.52%	-5.54%	-6.77%	-6.79%	-10.76%	-10.80%
<b>FUEIP100</b>	-8.55%	-7.86%	-10.18%	-10.61%	-13.43%	-14.21%
<b>FUEVFNVD</b>	-4.59%	-4.71%	-5.72%	-5.87%	-8.93%	-9.18%
<b>FM</b>	-6.40%	-5.76%	-7.60%	-6.77%	-11.03%	-9.66%
<b>FTSE</b>	-9.32%	-8.17%	-12.08%	-10.53%	-20.92%	-18.07%

*Source: Authors' Calculation*

After conducting preliminary evaluations and ARX-GARCH models, the researchers calculate the VaR to determine the ETFs are appreciated by financial indexes and the funds need to be cautious in the model result, which are truly accurate when the market experiences bad events with different levels of confidence. The results show that FUEVFNVD has the lowest loss ratio when the market experiences fluctuations on November 2, 2022, and this fund is also appreciated in Table 1. Meanwhile, the FUEIP100, FM and FTSE funds are underestimated, specifically the Alpha, Sharpe and Treynor Ratio are negative, and the Loss Ratio of these three funds is also higher than that of the other funds. In addition, the results of the ARX-GARCH model show that the E1VFN30, FUESSV50 and FUEMAV30 funds are expected but are not yet performing effectively, their Loss ratios are also slightly higher than the benchmark. As a result, having the relation between the preliminary evaluations, the mispricing and VaR shows that the funds appreciated have lower the minimum loss ratios when the market experiences adverse fluctuations. Furthermore, if mispricing of the fund, these funds will have higher risks than the other.

#### **4.5 Value at Risk-Backtesting**

According to Table 6 and 7, VaR is calculated at different confidence levels by GARCH-t and GJR-GARCHt models. After Backtesting using the POF-test and Mixed Kupiec test, it is found that the GJR-GARCHt model is more accurate and suitable when the number of violations failure rate of almost all ETF funds is in the number of expected exceptions. While the GARCH-t method in some cases have the observed number of exceptions exceeds expected exceptions but still cannot reject H0 by using both the POF-test and Mixed Kupiec test such such the FUEVFNVD fund case at 90% and 95% confidence levels in GARCH-t model and the FM fund at 90% confidence level in both the GARCH-t and GJR-GARCHt models. In addition, for some funds, the number of violation failure rates are too small compared to the expected exceptions, so the hypothesis is rejected, and the model was incorrect, which include E1VFN30 fund at 95% confidence level, FUEIP100 fund at 90% confidence level, and FM fund in 90%,95% and 99% confidence level. Moreover, two funds have the observed number of exceptions exceeding expected exceptions of the GARCHt model but can't reject H0 by using POF-test because of not enough distance, consisting of FUEMAV30 and FM funds, with the respective confidence levels of 99% and 95%.

**Table 5. POF test Result**

Model		GARCH-t	GJR GARCHt	GARCH-t	GJR GARCHt	GARCH-t	GJR-GARCHt
ETF Fund	Confidence Level	Test statistic $LR_{POF}$		Critical Value $\chi^2(1)$		Test Outcome	
E1VFN30	90%	2.23	2.27	2.706		Accept	Accept
	95%	4.56473	5.86	3.841		Reject	Reject
	99%	94.04	2.701	6.635		Reject	Accept
FUESSV30	90%	2.28100	1.49	2.706		Accept	Accept
	95%	0.71069	0.71	3.841		Accept	Accept
	99%	-	-	6.635		-	-
FUESSVFL	90%	1.13472	1.95	2.706		Accept	Accept
	95%	0.62102	1.79	3.841		Accept	Accept
	99%	1.31178	1.31178	6.635		Accept	Accept
FUESSV50	90%	3.38	0.0538	2.706		Reject	Accept
	95%	0.01	0.9998	3.841		Accept	Accept
	99%	2.54	2.556	6.635		Accept	Accept
FUEMAV30	90%	0.37403	2.48	2.706		Accept	Accept
	95%	0.13	1.73	3.841		Exceeding Expected exceptions	Accept
	99%	0.14	0.14	6.635		Accept	Accept
FUEVN100	90%	1.9992	1.23	2.706		Accept	Accept
	95%	1.899254	3.20	3.841		Accept	Accept
	99%	0.366864	0.366864	6.635		Accept	Accept
FUEIP100	90%	6.78	6.78	2.706		Reject	Reject
	95%	3.267035	1.23	3.841		Accept	Accept
	99%	-	-	6.635		-	-
FUEVFNVD	90%	0.33	0.00950	2.706		Exceeding Expected exceptions	Accept
	95%	0.76	2.4980	3.841		Exceeding Expected exceptions	Accept
	99%	0.994624	0.994624	6.635		Accept	Accept
FM	90%	1.09	1.47	2.706		Exceeding Expected exceptions	Exceeding Expected exceptions
	95%	12.94	19.042	3.841		Reject	Reject
	99%	0.5732523	2.5125	6.635		Exceeding Expected exceptions	Accept
FTSE	90%	23.30	0.175	2.706		Reject	Accept
	95%	18.45	0.65	3.841		Reject	Accept
	99%	0.708361	2.412	6.635		Reject	Accept

Source: Authors' Calculation

**Table 6. Mixed Kupiec test Result**

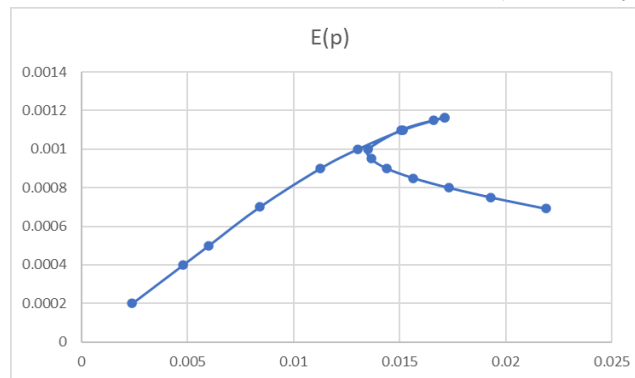
Value at Risk		GARCHt			GJR-GARCHt		
ETF FUND	Confidence Level	Test statistic $LR_{Mix}$	Critical Value $\chi^2(n+1)$	Test Outcome	Test statistic $LR_{Mix}$	Critical Value $\chi^2(n+1)$	Test Outcome

E1VFN30	90%	3.43	37.92	Accept	2.70	39.09	Accept
	95%	20.42	19.68	Reject	21.56	18.31	Reject
	99%	94.30	57.342	Reject	5.820	6.635	Accept
FUESSV30	90%	12.874	18.549	Accept	8.04	19.81	Accept
	95%	9.635	14.067	Accept	9.63	14.07	Accept
	99%	-	-	-	-	-	-
FUESSVFL	90%	1.866	23.542	Accept	2.96	22.31	Accept
	95%	4.76	16.919	Accept	7.84	14.07	Accept
	99%	5.46	9.210	Accept	4.535	9.210	Accept
FUESSV50	90%	61.14	59.77	Reject	1.75	15.99	Accept
	95%	3.450	30.14	Accept	4.60	30.14	Accept
	99%	6.75	9.210	Accept	6.36	9.210	Accept
FUEMAV30	90%	10.62	19.81	Accept	5.41	15.99	Accept
	95%	23.96	22.36	Reject	4.49	11.07	Accept
	99%	2.06	9.21	Accept	2.93	9.21	Accept
FUEVN100	90%	7.62	19.81	Accept	3.44	21.06	Accept
	95%	12.26	12.592	Accept	6.22	11.07	Accept
	99%	6.50	9.210	Accept	2.06	9.210	Accept
FUEIP100	90%	17.83	6.25	Reject	11.32	6.25	Reject
	95%	5.01	5.99	Accept	4.8072	5.99	Accept
	99%	-	-	-	-	-	-
FUEVFNVD	90%	1.94	30.81	Exceeding Expected exceptions	3.79	29.62	Accept
	95%	15.38	22.36	Exceeding Expected exceptions	6.89	12.59	Accept
	99%	4.25	9.210	Accept	4.22	9.210	Accept
FM	90%	5.08	54.09	Exceeding Expected exceptions	5.31	55.23	Exceeding Expected exceptions
	95%	23.37	7.81	Reject	33.30	9.49	Reject
	99%	92.72	16.81	Reject	2.720	9.210	Accept
FTSE	90%	30.38	18.55	Reject	4.588	43.75	Accept
	95%	20.43	9.49	Reject	12.82	25.00	Accept
	99%	2.4988	11.345	Accept	2.495	9.210	Accept

Source: Authors' Calculation

According to Table 8 and 9, the GJR-GARCHt model is accurate and suitable for most ETF funds except for the FUEIP100 and FM funds, while the GARCHt model is not suitable for the E1VFN30, FUEMAV30, FUEIP100, FUEVFNVD, FM, and FTSE funds. As a result, this study should use the GJR-GARCH method instead of the GARCH-t method to calculate the more incorrect VaR.

The FUEVFNVD and FUESSVFL funds have achieved higher-than-expected profits compared to other funds. However, their volatility and risks are also higher. In addition, FUEVFNVD has a Sharpe ratio that exceeds all other funds and FUESSVFL is in second place. Besides, these two funds have also shown better historical investment efficiency. According to the ARX model, investors should be cautious in valuing E1VFN30, FUESSV50, and FUEMAV30 funds, as they are currently overvalued compared to their real values. Moreover, given the complex fluctuations of the market, it is not guaranteed that ETF funds will perform as expected. Therefore, investors need to build an optimal investment portfolio to prevent risks while ensuring profits. As a result, the researchers propose a recommended investment portfolio based on previous evaluations and the VaR-GJR-GARCH model’s loss ratio (selected by backtesting).



**Graph 1. Efficient Frontier**

Source: Authors’ Calculation

**Table 7. Proposed Investment Portfolio**

	<b>FUESSVFL</b>	<b>FUEVFNVD</b>
Weight	13.74%	86.26%

Source: Authors’ Calculation

When an investor has some capital to invest, the allocation for FUEVFNVD is 86.26% and FUESSVFL is 13.74%, and this portfolio provides the lowest risk.

**Table 8. Loss Ratio and Standard Deviation of Proposed Investment Portfolio**

Confidence level	90%	95%	99%
Portfolio loss rate	-5.53%	-6.88%	-10.85%
Portfolio standard deviation	0.017221602		

Source: Authors’ Calculation

From the proposed investment portfolio, it can be seen that the minimum loss rate for investors in the market fluctuations with varying probabilities is lower than that of individual investments. At the same time, according to the efficient frontier graph, the portfolio proposed by the research team is optimal. This helps investors to prevent risks.

**5. CONCLUSION AND RECOMMENDATION**

**5.1 Conclusion**

The authors have observed that funds with good preliminary evaluations are less likely to be mispriced, resulting in lower levels of risk. Conversely, funds with poor preliminary evaluations are more prone to



mispricing and higher levels of risk. Besides, the mispricing is less influenced by macroeconomic factors and is primarily affected by internal factors and the VNIndex. This research will provide investors with a more comprehensive understanding of the relationship between preliminary evaluations, mispricing index, and value at risk. However, there are still some limitations to this study, including the following: Regarding preliminary evaluations, additional indices such as Sortino ratio, Fama method, etc., can be implemented to provide a more comprehensive assessment of fund performance; ETFs are relatively new investment tools in Vietnam, and the limited trading volume restricts the effectiveness of ETFs in the stock market; Some funds lack sufficient data for the ARX-GARCH model, and the data collected for certain funds may not cover a sufficiently long period. Therefore, the evaluation and comparison of ETF models may not be entirely accurate. Some suggestions for future research: It is necessary to regularly calculate indices, models, and Value at Risk (VaR) because past data alone cannot guarantee the effectiveness of future evaluations. Therefore, investors should evaluate the performance of ETF funds periodically; The research team suggests constructing an investment portfolio based on the investor's lowest risk tolerance. However, it is possible to create multiple investment portfolios to align with the risk appetite of each investor group.

## 5.2 Discussions

(Trang, 2023) ETF funds recorded a net capital inflow of 12,636 billion VND in Q4/2022. Among them, VNDiamond ETF fund ranked second with 2,890 billion VND, accounting for 22.36% of the total, just behind the foreign fund Fubon ETF. In fact, since its launch in May 2020, the FUEVFNVD fund certificate of DCVFM Diamond ETF has consistently been among the best-performing funds in the market and of course, significantly outperforms important indices such as VN-Index or VN30 over the same period. It is not an exaggeration to say that Diamond ETF can both be an attack weapon in an uptrend and a safe haven in a downtrend (according to Cafef newspaper). Based on a preliminary evaluation, DCVFM VNDiamond ETF is one of the good domestic funds that deserves consideration and investment. This ETF also has its own attraction thanks to its quality reference portfolio. The fund's index portfolio currently includes 18 stocks that meet the condition of foreign investor ownership of at least 95%, of which MWG, FPT, REE, PNJ... are the names with the highest proportion (according to Cafef newspaper). Therefore, the author group proposes to prioritize investment in the FUEVFNVD fund, followed by the FUESSVFL fund, which has a negative correlation with many other funds, including FUEVFNVD, and may also consider adding the FUESSV30 or E1VFN30 fund (according to the research results of the author group). Depending on investors' risk appetite, capital source, and market situation, they should make rational investment decisions for themselves to achieve the best possible profit level. In addition, investors should consider factors that affect the mispricing of funds and the loss rate to make appropriate investment decisions. Investors should also build a suitable portfolio to prevent risks in the complex market fluctuations.

In our study, there are some limitations that need to be addressed. Firstly, in terms of preliminary evaluation, additional indices such as the Sortino ratio and the Fama method can be applied to comprehensively evaluate the performance of the funds. Secondly, ETFs are a relatively new investment tool in Vietnam, and the trading volume of the funds is still limited, resulting in their performance in the stock market being less effective. Additionally, the duration of data collection to conduct the ARX-GARCH model is not sufficiently long. Lastly, the Value at Risk test has only been back tested using the POF-test and Mixed Kupiec test.

As guidelines for further research, we suggest that investors regularly calculate indices, models, and VaR values in order to evaluate the performance of ETF funds. This is important because past data may not

fully reflect future evaluations. By regularly assessing their investments, investors can ensure that they are making informed decisions and adjusting their strategies as needed. Additionally, it is important to consider a variety of criteria when evaluating ETF fund performance, such as the fund's historical returns, expense ratios, and management fees.

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## REDUCING CREDIT DEFAULT RISK IN COMMERCIAL BANKS BASED ON CREDIT SCORING USING MACHINE LEARNING

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**ABSTRACT:** Credit risk management is a top concern of commercial banks because it directly affects the financial stability and profitability of these banks. Accurately assessing and predicting credit default risk is critical to minimizing potential losses. This study focuses on minimizing credit default risk in commercial banks using supervised machine learning techniques, namely credit scoring. The proposed method uses historical credit data to develop a credit scoring model based on supervised machine learning algorithms. By leveraging a data set containing past credit transactions and related outcomes, the model explores patterns and relationships between different credit attributes and defaults. This allows the model to generate a credit score to quantify the creditworthiness of a potential borrower.

**Keywords:** Credit score classification, Machine learning, Stacked Generalization Classification

### INTRODUCTION

The importance of credit scoring in lending decisions for financial institutions and the economy at large cannot be denied. Reliable and effective credit scoring enables lenders to manage their risk exposure through selective credit allocation based on a statistical analysis of previous customer data. Back in 2007 and 2008, there was a severe financial crisis in the US leading to a large-scale collapse of the US institutions. About 10,000 billion US dollars disappeared, 30 million were employed, and a series of bankrupt banks (Duignan, 2023). This is the most severe economic downturn in the US since the Great Depression in 1929. The reason comes from US financial institutions starting to offer risky mortgage loans to rescue real estate buyers. The form of mortgage is aimed at low-income home buyers, with less knowledge, less information, and very high lending risks. At that time, these banks did not consider borrowers and their ability to pay the loan. When the bubble of real estate popped out, not only the US banking system collapsed but the whole world suffered a global economic crisis. It is clear that credit scoring is an essential activity, not only to ensure recoverable loans but also as a foundation for developing a thriving financial system. With the background of nowadays government's consumption stimulation, consumer demand tends to increase, which indirectly leads to an increase in demand for consumer loans. Banks cannot simply employ human resources for analysis when confronted with that issue and a vast and complicated volume of credit information. As a result, several quantitative ways to evaluate credit risk have been proposed in recent years. Data mining is a technique that has gained greater traction than other techniques because it can take genuine knowledge from databases and transform it into valuable information. However, unstructured data, such as text, emails, or telephone calls, cannot be used directly in the standard techniques for credit default prediction without first undergoing processing. That is why more studies using machine learning have been used to exploit this information for credit risk predictions (Kriebel & Stitz, 2022).

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The use of Machine Learning in the banking industry can be the way to reduce the risk of default by “eliminating” customers with high repayment risks, thereby minimizing risks in credit transactions. In addition, this study evaluates the extent to which a supervised machine learning model accurately predicts the classification results of customers with large data sets to limit the risk because machine learning techniques frequently lack the capacity to comprehend data and persuade clients to follow (Dumitrescu, Hué, Hurlin, & Tokpavi, 2022). The study’s main goal is to divide credit applicants into three categories: “good credit”, which is accountable for repaying debts; Credit will not be granted to those with “poor credit” because of the high likelihood of default and the “standard credit”. This classification serves as a foundation for banks to analyze customer solvency and make loan-granting decisions, lowering the risk of credit failure. Simultaneously, when assessing and evaluating, Machine Learning approaches help save time and money in credit scoring and loan decision-making, boost business efficiency, and reach new potential consumers considering some critical customer qualities. Limiting credit default risk leads to multiple benefits for commercial banks. Banks can avoid significant financial losses by minimizing the default risk. It also results in increased profitability as banks can invest more in profitable ventures instead of provisioning for non-performing loans. Additionally, implementing credit scoring models leads to better decision-making, increased operational efficiency, and higher customer satisfaction as banks can offer tailor-made loan products that match the customer’s creditworthiness and needs (Kithinji, 2010).

Numerous studies have been conducted on the application of machine learning in evaluating credit. (Munkhdalai, Munkhdalai, Namsrai, Lee, & Ryu, 2019) carried out a study to compare the FICO credit score with machine learning credit scoring. The techniques employed in this study include Multilayer Perceptron (MLP) neural network, XGBoost algorithm, and Random Forest Regression. (Busmann, Giudici, Marinelli, & Papenbrock, 2021) takes a strategy that combines network analysis with Shapley values to post-process the analysis findings when used with the XGBoost machine learning model. Each of these strategies offers benefits that point to ways to improve financial sector operations. However, they concentrate on analyzing the outcomes of each unique algorithm separately. In this work, we also use the Machine Learning method to predict and classify data, to classify and evaluate credit scores. The current study seeks to make the following contributions to the existing literature. First, the study will compare the performance of ensemble approaches, which combine the judgments of various classification models that have resulted in superior classification performance than those of individual models. Second, this study classified clients into three groups: “poor credit”, standard credit”, and “good credit”, noting that earlier studies tended to focus on binary categories like “likely to default” and “unlikely to default”.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Credit default**

The majority of banking profits are generated through lending activities and the issuance of credit/loans. Lending out credit is an important component of what banks operate since it may result in significant profits. However, there is also a large risk associated with making decisions in this area, and financial institutions can face significant losses as a result of mistakes (Dang Huong Giang, 2020). This failure of operation can be considered a credit default, in which financial institutions’ customers do not fully repay or fail to repay a loan by the set time, leading to difficulties in the bank’s business and financial operations. The occurrence of credit default risk can be caused by many reasons such as customers’ financial inability, unfavorable business situation, or customers’ lack of goodwill in debt repayment (Gizaw, Kebede, & Selvaraj, 2015). Credit default risks negatively affect the bank’s business activities such as affecting customer deposits,

causing reduced profits or financial losses, and adversely affecting the reputation of the bank. Therefore, managing and minimizing the risk of credit default is very important to ensure the sustainability of the bank's business and financial operations and to use credit scores as a tool to limit the credit default risk.

### **2.1.1. Credit score**

Credit score is a number that reflects a person's credit history (*Surviving Debt: Expert Advice for Getting Out of Financial Trouble*, 2023), and is a decision support system that helps managers in the financial decision-making process. This is an important decision of commercial banks in considering "accepted" or "rejected" a person's credit application. The "accepted" or "rejected" depends on the credit score based on the expectation that the person will be able to repay or not to his or her financial obligations. Thus, when evaluating and approving a loan from people with low credit scores, banks will tend to increase interest rates, require collateral or refuse to give loans. Therefore, in order to limit credit default risks, banks will need to assess the financial capacity and ability of customers to pay debts. Credit scores are used to assess a customer's ability to pay off debt in the future. If the customer has a high credit score, the bank will assess the customer's default risk lower, assign the customer a lower interest rate, and grant the customer a loan with a higher limit (Lee, Park, & Heo, 2019).

Commercial banks use a method known as credit scoring. Credit scoring method is a method of assessing a borrower's credit score, based on the use of algorithms and credit models, it is used to provide a credit score for each borrower. The credit scoring method has many advantages, including the ability to quickly and accurately assess a person's finances, help make an objective loan decision, and reduce risk for lenders.

### **2.1.2. Credit scoring risk**

Credit scoring algorithms and models are based solely on indicators from the collected data sets, regardless of the subjective abilities of individual credit borrowers. It can be said that a person encounters a house fire or traffic accident that makes them unable to repay their credit, which can cause bad debt that cannot be disbursed by the bank. In fact, information about individual circumstances or local economic conditions is not included in the performance of the credit score classification judgment model (Avery, Calem, & Canner, 2004). In addition, the reliability of the data also affects the analysis of the credit score results, the level of confidence in the data based on the profile provided by the borrower and through the bank's validation process. Choosing the wrong model to classify credit scores makes the results after implementation have many errors in assessing whether to "accept" a person's loan application, which will affect the creditworthiness of bank credit and security information leakage can also occur when applying models and algorithms based on customer historical data sets.

### **2.1.3. Machine Learning**

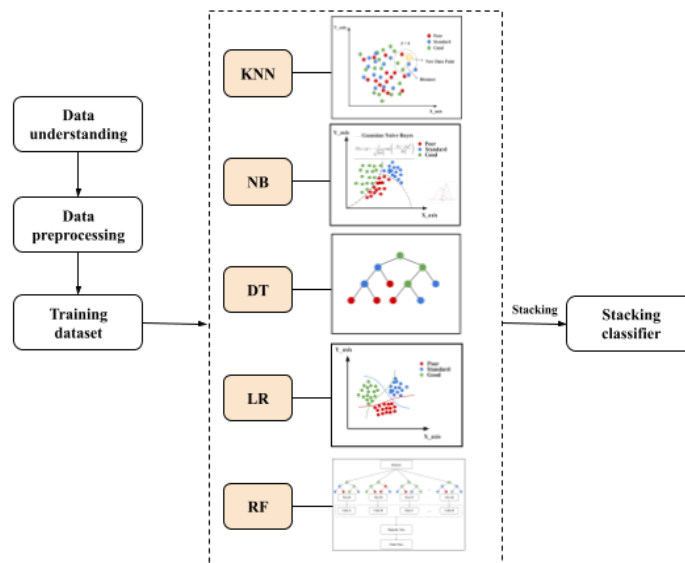
Machine Learning, a branch of artificial intelligence, is a technique for improving system performance by learning from experience through computational methods. The purpose of Machine Learning is to learn from data. Sometimes after viewing the data, one cannot interpret the pattern or extract information from the data. In that case, we will apply Machine Learning. When designing and building Machine Learning systems, it is necessary to consider factors such as problem identification, data collection, and creation, data evaluation, predictive modeling, etc. The use of different datasets leads to different types of Machine Learning. There are two main types of Machine Learning: Supervised Machine Learning and Unsupervised Machine Learning. Among them, Supervised Machine Learning is commonly used, and we also use this form of Machine Learning in credit score classification.

**2.1.4. Supervised Machine Learning**

Supervised Machine Learning is a method where algorithms learn features from a training data set, and then apply it to a test set for classification or prediction purposes. The training set and the test set are divided from an input data set, where the training set includes the input values needed for prediction or classification. Supervised Machine Learning is commonly used in credit scoring models to find the relationship between customer features and credit default risk and then predicts default classification usually in binary format. Across many literature sources, the implementation of Supervised Machine Learning algorithms in credit scoring models has shown good prediction accuracy.

**3. RESEARCH METHOD**

This study uses the Staking classification method. After data was preprocessed, they will be used to run individual models, these are K-nearest Neighbor, Naïve Bayes, Decision Tree, Random Forest, and Logistic Regression. The final classifier will be conducted by mapping all models based on the Stacking classifier. This model is used to classify 3 classes of borrowers: Bad Credit, Standard, and Good Credit. Figure 1 shows the approach method of this study.



**Figure SEQ Figure \\* ARABIC 1. Recommended credit scoring model**

Phase 1: Data understanding with credit scoring dataset.

Phase 2: Training dataset is data that has been processed to put the data set into the scoring model.

Phase 3: Use five individual models including to predict outcomes and show comparisons of results.

Phase 4: After considering the return results of the lowest model, it will continue to use that model according to the Stacking method in combination with the remaining models to calculate the results of the accuracy of the combined models.

Phase 5: Synthesize and analyze the final results to assess the appropriate capabilities of future models and choose the most necessary model for the business.

**Logistic Regression**

Logistic Regression (LR) is a popular statistical regression model used for binary classification tasks. It is a supervised learning algorithm that predicts the probability of a binary outcome based on one or more

independent variables. Unlike linear regression, which is used for predicting continuous values, logistic regression is designed for predicting a categorical variable with two possible outcomes, often referred to as the positive class and the negative class. The dependent variable in logistic regression is typically binary (0 or 1), representing the two classes.

### ***K-Nearest Neighbor***

K-Nearest Neighbor (KNN) is a popular algorithm used in Machine Learning for both classification and regression tasks. It is a non-parametric and instance-based learning algorithm, meaning it doesn't make assumptions about the underlying data distribution. The choice of the parameter  $k$  is crucial and can significantly impact the performance of the algorithm. A small value of  $k$  may result in a noisy decision boundary, while a large value of  $k$  may smooth out the decision boundary too much. KNN is a simple and intuitive algorithm, but it can be computationally expensive, especially when dealing with large datasets. Additionally, it requires the definition of a suitable distance metric to measure the similarity or dissimilarity between data points, such as Euclidean distance or Manhattan distance.

### ***Naive Bayes***

Naive Bayes (NB) is a classification algorithm based on Bayes' theorem, which is a fundamental concept in probability theory. It is a simple yet powerful algorithm commonly used in Machine Learning and natural language processing tasks. Bayes' theorem states that the posterior probability of a class label given the observed features is proportional to the prior probability of the class label multiplied by the likelihood of the observed features given the class label. The Naive Bayes algorithm assumes that the features (or attributes) are conditionally independent given the class label. This is called the "naive" assumption, as it assumes that there is no correlation between the features. Naive Bayes is particularly useful when dealing with high-dimensional data, such as text classification, spam filtering, or sentiment analysis. It can handle a large number of features efficiently, as the computational complexity is linear with the number of features.

### ***Decision Tree***

Decision Tree (DT) is one of the most popular methods used in various fields, such as Machine Learning, and image processing. This method is shaped like a tree, consisting of nodes and branches. Each node represents features in a category to be classified and each subset defines a value that can be taken by the node. Because of their simple analysis and accuracy on many types of data, DT has found many implementation fields.

### ***Random forest***

Random Forest (RF), which aggregates multiple trees by combining different DTs, is a Supervised Learning Classification model for building a forest from a set of trees. The paired trees are trained for random feature selection using an internal bootstrap mechanism that does not allow interaction between DTs. It detects outliers and anomalies in the dataset. It can be said that RF is one of the most accurate Machine Learning methods, generating accurate and highly categorical classifiers for many datasets.

### ***Stacked generalization***

Stacked generalization (SG) is one of the methods that combine many Machine Learning methods to improve predictability. It is based on training a learning algorithm to combine the predictions of related learning algorithms instead of choosing a single learning algorithm (Tugay & Oguducu, 2020). In this study, the implementation consisted of two phases. The first is to use the 5 algorithms mentioned above to train on the available data set. After making the final prediction of 5 algorithms, choose the algorithm with the lowest predictability and combine it with the remaining 4 algorithms to give the best predictability for this problem.

**Performance metric**

To assess the credit classification ability of the models listed above, this study uses confusion matrix, and performance metrics such as accuracy, precision, recall, F1-score, sensitivity, and specificity.

**Table 1. Example of confusion matrix**

<b>Predicted Actual</b>	<b>Positive</b>	<b>Negative</b>
<b>Positive</b>	True Positive	False Negative
<b>Negative</b>	False Positive	True Negative

In addition, to measure the performance of models at various threshold settings, it is necessary to use Receiver Operating Characteristics (ROC) - a probability curve and Area Under Curve (AUC) - representing the classification level of the model. It indicates the more accurate the prediction of the classes of a model the closer the AUC is to 1. With the vertical axis being True Positive Rate (TPR) and the horizontal axis being False Positive Rate (FPR) (Narkhede, 2018).

**4. RESULTS AND DISCUSSION**

The data used for the credit scoring model is the copyright CC0 credit-related information dataset, which consists of 28 columns and 100,000 rows. It can be divided into three different types: numerical columns, categorical columns, and unrelated columns for business problems. For this study, there are 12 independent variables that are considered: Credit\_History\_Age, Num\_Credit\_Cards, Credit\_Mix, Annual\_Income, Delay\_from\_due\_date, Payment Behaviour, Age, Occupation, Total\_EMI\_per\_month, Outstanding\_Debt, Num\_of\_Delayed\_Payment, and Monthly\_Balance.

After performing data preprocessing, table 2 shows the results of the distribution of credit\_score values, where the Standard class accounts for more than 50% of the dataset. The dataset is divided into two parts: 80% for training and 20% for testing. Therefore, the test set also has a difference in frequency between values, concentrated in the Standard class.

**Table 2. Distribution of credit\_score values**

	<b>Bad</b>	<b>Standard</b>	<b>Good</b>	<b>Total</b>
<b>Frequency</b>	18,419	34,744	11,765	64,928
<b>Percentage</b>	28.4%	53.5%	18.1%	100%

Table 3 shows the suitable hyperparameters for each individual model. After selecting the hyperparameter, each model will be trained with the training set using a cross-validation method with k = 5. This study focuses on multiclass classification. Therefore, the tables below show the classified ability of the five models in the direction of A and NOT A: classify class zero versus NOT zero (class one or class two); classify class one versus NOT one (class zero or class two); classify class two versus NOT two (class zero or class one).

**Table 3. Hyperparameter**

<b>Model</b>	<b>Hyperparameter</b>	<b>Value</b>
<b>Random forest</b>	N-estimators	9
	criterion	gini
	max_depth	9



<b>Decision tree</b>	criteria	log_loss
	max_features	sqrt
	min_samples_split	3
<b>K-Nearest Neighbor</b>	n_neighbors	5
	metric	manhattan
	weights	distance
<b>Naive Bayes</b>	var_smoothing	0.53366

#### 4.1. Five individual models

**Table 4. Confusion matrix and AUC of five individual models**

		TP	FP	TN	FN	AUC
<b>Logistic Regression</b>	0 vs rest	1,060	969	8,377	2,580	0.74
	1 vs rest	5,965	4,877	1,150	994	0.52
	2 vs rest	41	74	10525	2,346	0.70
<b>K-Nearest Neighbor</b>	0 vs rest	2,134	1,335	8,011	1,506	0.93
	1 vs rest	4,974	2,422	3,605	1,985	0.85
	2 vs rest	1,138	983	9,616	1,249	0.93
<b>Naive Bayes</b>	0 vs rest	2,020	1,454	7,892	1,620	0.76
	1 vs rest	3,101	1,607	4,420	3,858	0.62
	2 vs rest	1,758	3,046	7,553	629	0.78
<b>Decision Tree</b>	0 vs rest	2,164	1,676	7,670	1,476	0.78
	1 vs rest	4,720	2,244	3,783	2,239	0.72
	2 vs rest	1,132	1,050	9,549	1,255	0.75
<b>Random Forest</b>	0 vs rest	2,291	1,116	8,230	1,349	0.86
	1 vs rest	5,151	2,032	3,995	1,808	0.80
	2 vs rest	1,389	1,007	9,592	998	0.88

With the *Logistic Regression model*, from table 4, there are some discussions. Class zero has quite an average number of false predictions, with FP = 2,580 and FN = 969. This shows that the model has the ability to falsely predict both Positive and Negative. Class one has a high number of false predictions, with FP = 994 and FN = 4,877. This shows that the model tends to predict wrongly when up to 4,877 samples are not class one but are misunderstood as belonging to class one. Class two has a low number of false predictions, with FP = 2,346 and FN = 74. Therefore, the model has the ability to predict at least 3 wrong models. Also from table 4, it can be seen that LR has better classification ability than random with AUC = 74 and AUC2 = 70. Class one has AUC = 0.52, whose value is at the average level. Therefore, this model has a relatively better classification ability than random, but the performance is not high.

From table 4, there are some discussions about the *K-Nearest Neighbor model's* performance. With class zero versus rest, it can be seen that the index of accurately predicting NOT zero points is high (TN = 8,011) and correctly predicting class zero correct points is also quite high (TP = 2,134). With class one versus rest, the number of correctly predicting points other than class one is quite low (TN = 3,605) and the number of correctly predicting class one correctly is quite high (TP = 4,974). With class two versus rest, the number of correctly predicting points other than class two is very high (TN = 9,616) and the score correctly

predicting class two is very low (TP = 1,138). The AUC value shows that the recognition of three classes is all good (AUC > 0.8) and very good (AUC > 0.9).

With *Naive Bayes model*, from table 4, there are some discussions. With class zero versus rest, the number of correctly predicted non-zero points (TP = 7,892) is quite high, and the number of predicting zero points (TP = 2,020) is also relatively large. With class one versus rest, a relative number of correctly predicted non-zero points (TP = 4,420). However, the number of falsely predicted zeros (TP = 3,858) is almost equal to the correct score. This is the point to note about this model. With class two versus rest, the number of correctly predicted non-zero points (TP = 7,553) is quite high. However, the number of falsely predicted non-zero points (TP = 3046) is the second highest in the model. This affects the accuracy of the prediction and needs more attention. About the area under the curve of the Naïve Bayes model, class two has the largest AUC (0.78), the second is class zero (0.76) and the lowest is class one (0.62). Thus, the Naive Bayes model is most effective for class two. However, the difference between classes is relatively large as well as the efficiency of the model for class one is quite low, leading to the prediction ability having many mistakes.

With the *Decision Tree* model, there are some discussions about its performance. About class zero versus rest, the prediction of zero points (TP = 2,164) and NOT 0 points (TN = 7,670) is relatively accurate. The biased predictions are also relatively low. With class one versus rest, the prediction of class one (TP = 4,720) and points other than class one (TN = 3,783) is relatively accurate. This is the most biased prediction in all 3 classes. About class two versus rest, the prediction of class-two points (TP = 1,132) and not-two points (TN = 9,549) has high accuracy. This has the lowest false predictions in all three classes. Also, the AUC of the classes has the relatively same area. In general, the Decision Tree model makes predictions for each class without much difference.

From table 4, there are some discussions about the *Random Forest model's* performance. With class zero versus rest, it can be seen that the number of correctly predicted non-zero points is very high (TN = 8,230), the number of correctly predicted class zero is also relatively (TP = 2,291), and the false predictions are also relatively high. For class one versus rest, there is a high number of correct predictions for class one (TP = 5,151) and a relatively high number of other classes one (TN = 3,955), but the model also predicts a lot of other classes one mistakenly for class one (FP = 2,072), which leads to quite high confusion rate between class one and other classes. Finally, two versus rest, similar to layer zero, has a high number of correct predictions other than class two (TN = 9,630), in addition, the number between FP and FN of this matrix is not too different, maybe The model also predicts quite well the classes of class two, but there are still some samples of class two that are misclassified and are considered as a non-class two sample. Also, class two with the highest AUC (0.88), the AUC value of class one (0.79) is lower than that of class zero (0.86), and class two (0.88) may affect the results, as the model class one classifier is not as efficient as class one. This will lead to misclassification more to other classes.

**Table 5. Performance matrix of five individual models**

	Class	LR	KNN	NB	DT	RF
Accuracy	0	0.729	0.781	0.763	0.757	0.810
	1	0.548	0.661	0.579	0.655	0.704
	2	0.814	0.828	0.717	0.822	0.846

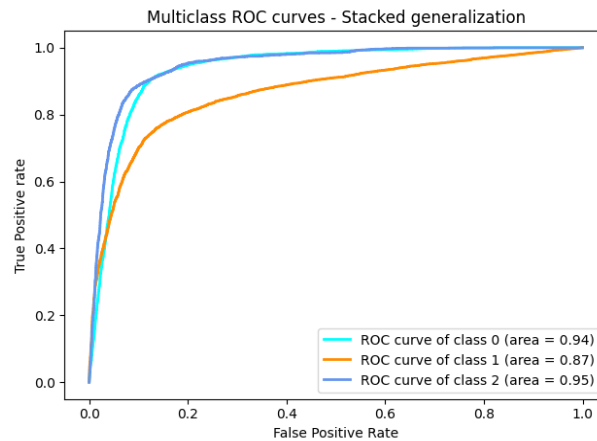
<b>Precision</b>	0	0.522	0.615	0.581	0.563	0.672
	1	0.550	0.673	0.659	0.678	0.717
	2	0.357	0.537	0.366	0.519	0.580
<b>Recall</b>	0	0.291	0.586	0.555	0.595	0.629
	1	0.857	0.715	0.446	0.678	0.740
	2	0.017	0.477	0.736	0.474	0.582
<b>F1 Score</b>	0	0.374	0.600	0.568	0.579	0.650
	1	0.670	0.693	0.532	0.678	0.728
	2	0.033	0.505	0.489	0.500	0.580
<b>Sensitivity</b>	0	0.291	0.586	0.555	0.595	0.629
	1	0.857	0.715	0.657	0.678	0.720
	2	0.017	0.477	0.520	0.474	0.582
<b>Specificity</b>	0	0.896	0.857	0.844	0.821	0.881
	1	0.191	0.598	0.733	0.628	0.663
	2	0.993	0.907	0.713	0.900	0.905

Table 5 shows the performance of five individual models. There are some findings about the results. First, most of the models give an accuracy of about 50%, in which, Logistic Regression gives the lowest results in class zero and class one, and Naive Bayes gives low results in class two. Meanwhile, Random Forest gives the best results in all three classes. Secondly, the indicators of precision, recall, and F1-score are similar, most of them are above 50%. Overall, Logistic Regression gave the lowest results and Random Forest gave the highest results. The Sensitivity index represents the ability to detect A (positive) and the Specificity indicates the ability to detect NOT A (negative). Models are most sensitive to class one when the sensitivity of class one is higher than that of the other classes. This happens because the dataset is unbalanced. Finally, Random Forest model gives the best results when five per six criteria are higher compared to the others. Meanwhile, Logistic Regression has 4 per 6 criteria lower than the remaining models. Thus, it can be concluded that using ensemble models can give better predictions than weak/individual models.

#### Stacked generalization model

**Table 6. Performance matrix of stacked generalization model**

<b>Class</b>	<b>0</b>	<b>1</b>	<b>2</b>
<b>Accuracy</b>	0.832	0.722	0.872
<b>Precision</b>	0.719	0.718	0.682
<b>Recall</b>	0.657	0.792	0.568
<b>F1 Score</b>	0.687	0.753	0.619
<b>Sensitivity</b>	0.657	0.792	0.568
<b>FPR</b>	0.343	0.208	0.432
<b>Specificity</b>	0.9	0.641	0.94
<b>FNR</b>	0.1	0.359	0.06



**Figure SEQ Figure \\* ARABIC 2. Multiclass ROC curve of stacked generalization model**

Table 6 shows the performance of the Stacked generalization model. The final results after running a stacked generalization model with five individual models for accuracy improved results in all three classes show that the best model result performance gives good results for the learning process to analyze the results type of credit score for the dataset.

With figure 2 of the ROC curve for the three classes, it is clear that the AUC index for each class is 0.94, 0.87, and 0.95, respectively. These values are proof that the stacked generalization model performs well in terms of classifications. That is, it is certain that the Stacked generalization model produces predictions that are the most accurate. Additionally, it works very well with class zero and class two when the AUC index is greater than 90%, which is a very good threshold for determining the categorization level.

#### 4.3. Discussion

From the unbalanced dataset, it can be seen that the results tend to be biased toward the Standard class. For ground truths that are Standard, the value is correctly classified quite a lot; for ground truths other than Standard, the values that are misclassified as Standard are also very many. This can be considered as a limitation of the data set for this study. However, from table 5 and table 6, it can be seen that the use of the association model, namely stacking, has overcome some limitations of the data, resulting in more effective credit classification results than individual use of models.

When the data sets utilized in various research and the goals of those investigations differ, it is impossible to compare the findings of one study with those of another. However, there are also similarities between the studies. Research by (Bussmann, Giudici, Marinelli, & Papenbrock, 2021) has increased the interpretability, speed, and accuracy of XGBoost’s algorithm in credit scoring, but has not yet been able to process the imbalance of the dataset. Current study also has the same problem. With the experimental results, Stacking can improve the model’s performance in this problem. From the research of (Munkhdalai, Munkhdalai, Namsrai, Lee, & Ryu, 2019), it can be seen that, although Random Forest Regression is not the algorithm that gives the best results, it has relatively high results, corresponding to the results. As a result of this study, Random Forest is considered to be the most feasible algorithm among individual models. As a consequence of this research, Random Forest is regarded as the individual models’ most practical method. The experimental findings demonstrate that the shortcomings of any individual model may be corrected by combining the data from numerous independent models: The limitations of Decision Tree are overcome by Random Forest, and the weakest of five poor models - including Random Forest - are overcome by the

stacking strategy utilized in this work. In general, this study's findings have added to those of earlier research in terms of enhancing machine learning performance in several areas of credit scoring and classification.

As mentioned in the introduction, providing loans plays an important role in the operation of each financial intermediary. To minimize the risk from lending, credit scoring is an indispensable step in the approval process. With the Stacked generalization model above, the results are good for the "Poor" class and "Good" class, quite good for the "Standard" class. When applying the model in business, it will assist banks in credit scoring and credit classification automatically, and then, with the results obtained from the model, loan records will be again reviewed by a professional. Instead of having to make a decision manually, by the use of ensemble models, commercial banks can boost the appraisal process, saving time and increasing efficiency as the validation goes through a minimum of two stages.

## 5. CONCLUSION AND FUTURE WORK

Any financial intermediary has to find a solution for the issue of credit categorization. Many credit classification methods, including K-Nearest Neighbor, Logistic Regression, Decision Tree, Random Forest, Naive Bayes, and Stacked Generalization, are introduced in this work. This research also contrasts and examines how well they can classify things. It is demonstrated using the results that Machine Learning approaches may be used to improve applied credit scoring. Using a customer's characteristics and credit data, decision-makers can use certain techniques to forecast whether the consumer will have a good or negative credit history. However, it should be emphasized that there is no such thing as a perfect model and a completely accurate classification. The presence of Machine Learning models only helping to speed up the credit scoring process, is a suggestion for financial intermediaries before approving loans. Financial institutions are using credit scoring algorithms more and more to develop better strategies. Therefore, with developments in information technology and modeling methodologies, credit scoring issues are one of the applications that have attracted significant attention over the past decade. More and more, financial institutions are seeking better strategies through the help of credit scoring models. Therefore, credit scoring problems are one of the applications that have gained serious attention over the past decades with advances in information technology and modeling techniques.

The future of Machine Learning in credit score classification is very promising and will see many improvements and developments in the coming years. One of the improvements that can be made is to use other algorithms to generate interdependent predictive models that provide superior accuracy. Optimizing data features for training can also improve model accuracy. In addition, the use of data analysis methods such as clustering, PCA, or feature selection to explore the relationship between features and credit scores can improve model performance. Ultimately, applying Machine Learning to improve people's credit scores will affect many aspects of their lives, especially financially. Therefore, developing a reliable and accurate Machine Learning model will be very important for credit decision-making.

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## PREDICTING LOAN APPROVAL USING MACHINE LEARNING

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**ABSTRACT:** *Personal loans are an important part of the overall credit activities of the bank, bringing great growth potential as well as sustainable profits for the bank. However, lending to individual customers will bring high risks. Therefore, forecasting the ability to pay debts on time is extremely important and necessary, helping banks enhance customer's ability to pay debts on time, contributing to minimizing bad debts and reducing them, and strengthening credit risk management. To predict the possibility of payment of the loan by the customer, the Machine Learning techniques have been used in predicting the outcomes for large amounts of data. In this study, the machine learning algorithms used are: Logistic Regression, Decision Tree, and Random Forest, which are applied to predict the customer's ability to repay in the bank sector.*

*Keywords: loan; approval; repay; machine learning; customer prediction; bank sector.*

### INTRODUCTION

Banks play an important role in the market economy. The success or failure of the organization largely depends on the credit risk assessment of the industry. Before granting credit to a borrower, the bank decides whether the borrower is bad (in default) or good (non-default). Distributing loans is the core business of most banks. The main part of the bank's assets comes directly from the profits obtained from the loans distributed by the banks. The main goal in a banking environment is to invest their assets in a safe place. Nowadays, many banks/financial firms approve loans after a process of verification and regression validation but it is still not certain whether the selected candidate is a worthy candidate among all the candidates or not (Pham & Nguyen, 2020).

In the context of the economy facing many difficulties and challenges, credit risks tend to be high and complicated, affecting the operations of banks. Credit risk of individual customers is not only an individual risk of each commercial bank, but also a concern of the banking system within each country and globally, affecting the development of the banking system of the whole economy. In order to prevent losses, through predictive analytics of collected data, this paper can give insights which will help businesses make better decisions, take advantage of advantageous competition, increase profits, satisfy stakeholder expectations and steadily enhance the bank's strength and reputation in the marketplace. To understand customer behavior and gain insights into the long-term values of the company and the consumer, customer solvency prediction provides the transaction history of the client group. This may create chances for corporate expansion. Knowing the elements that affect a borrower's ability to repay loans and identifying those with high ability to do so will make banks more appealing to customers.

Machine learning is an evolving branch of computational algorithms that are designed to emulate

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human intelligence by learning from the surrounding environment. They are considered the working horse in the new era of big data. Techniques based on machine learning have been applied successfully in diverse fields ranging from pattern recognition, computer vision, spacecraft engineering, finance, entertainment, and computational biology to biomedical and medical applications (Murphy et al., 2015). Based on the desired outcome of the algorithm, the machine learning algorithms are organized in the following groups:

**Supervised learning** - the various algorithms generate a function that maps inputs to desired outputs. One standard formulation of the supervised learning task is the classification problem: the learner is required to learn (to approximate the behavior of) a function which maps a vector into one of several classes by looking at several input-output examples of the function.

**Unsupervised learning** - models a set of inputs: labeled examples are not available.

**Semi-supervised learning** - combines both labeled and unlabeled examples to generate an appropriate function or classifier.

**Reinforcement learning** - the algorithm learns a policy of how to act given an observation of the world. Every action has some impact in the environment, and the environment provides feedback that guides the learning algorithm.

**Transduction** - similar to supervised learning, but does not explicitly construct a function: instead, tries to predict new outputs based on training inputs, training outputs, and new inputs.

**Learning to learn** - where the algorithm learns its own inductive bias based on previous experience.

Besides these groups of machine learning algorithms, they are basically divided into two general groups, supervised and unsupervised learning.

Thanks to the ability and power of machine learning, there are many reports and articles in the same field of classification on the repayment ability made. The article “Predicting on-time debt payment behavior of individual customers at commercial banks” by Pham Thi Huyen and Nguyen Van Ton used machine learning to provide assessment results. These authors used single unsupervised machine learning models as decision trees or for evaluation. The study aims to collect and analyze relevant data, build different machine learning models, compare their performance, and use ensemble approaches to enhance the predictive power of the best-performing model. Ultimately, the goal is to provide insights into the factors that influence customer repayment behavior and develop a robust model for predicting future behavior, which can be used to improve decision-making and risk management in the financial industry.

## 2. THEORETICAL FRAMEWORK

### 2.1. Lending activities

The economy now is changing, competition is increasing in the financial world, and lending has become inevitable. There are many people around the world who in some way borrow money from banks or financial institutions for various reasons to help them overcome financial difficulties and achieve some personal goals. Madaan and his partner (2021) posit that lending is the main income source and the biggest financial risk source for commercial banks. Although lending activities bring benefits to both parties, this activity carries huge risks. In the lending industry, investors offer loans to borrowers in exchange for the promise of repayment with interest. Thus, lenders face the problem of predicting the risk of a borrower defaulting on a loan. Therefore, assessing the credit worthiness of customers before allowing loans is very necessary.



## **2.2. Using machine learning in the field of bank**

### **2.2.1. The application of machine learning in banks**

Leo & Maddulety (2019) define machine learning as a rapidly developing technology in recent years, widely applied in many fields, including banking/financial sector. The research shows that by 2027, 23% of the job market in finance will have changed, with AI and machine learning playing a pivotal role in enhancing efficiency and the automation process. Every new piece of information supplied can increase the predictive power of these models, resulting in an increase in predictive power over time. Within a bank's risk organization, machine learning is anticipated to be used in a variety of contexts.

Aluko & Bagheri (2012) mention Anti-Money Laundering (AML) and Fraud Pattern Detection: AML refers to a set of procedures, laws, or regulations designed to stop the practice of generating income through illegal means. Actually, many countries are now embracing the power of AI and machine learning in fraud detection. They are attempting to strengthen their surveillance system by implementing AI and machine learning. Notably, AI is revolutionizing the banking sector by offering clients personalized services like chatbots that offer self-help answers, which lighten the pressure on call centers. AI and machine learning adoption in the banking sector eliminates human error in high-frequency repetitive tasks.

Another application of AI and machine learning which is risk management is the building tenets of AI and machine learning are learning from past data. Therefore, machine learning and AI are sweeping over the banking sector, where bookkeeping and records are their second name. With support from machine learning and AI, banks can detect and predict the potential risks.

### **2.2.2. Using machine learning in loan approval**

The success or failure of an organization now largely depends on the industry's ability to evaluate credit risk. The prediction of borrower status in future will be defaulter or non defaulter is a challenging task for any organization or bank. Aphale et al (2020) said that credit risk assessment is a crucial issue faced by banks nowadays, which helps them to evaluate if a loan applicant can be a defaulter at a later stage so that they can go ahead and grant the loan or not. This helps the banks to minimize the possible losses and can increase the volume of credits.

## **2.3. Machine learning models**

### **2.3.1. Random Forest**

First introduced by Breiman (2000) as a modification to the simple bagging algorithm, it uses bootstrapped samples of data and a randomly selected subset of variables to build a number of decision trees, and then combines their output via the simple voting. The RF algorithm begins with a bootstrap-sampled data set and builds one decision tree from each bootstrap sample. Hence, in RF, the bootstrap sampling technique applies to both a random selection of cases and a random selection of features.

### **2.3.2. Decision tree**

Decision tree is a machine-learning technique that follows a set of if-else conditions to visualize the data and classify it according to the conditions. Decision tree analysis is arguably the most popular classification technique in the data mining arena. Decision tree algorithms, in general, build an initial tree from training data such that each leaf node is pure, and they then prune the tree to increase its generalization, and hence, the prediction accuracy of test data (Sharda et al., 2021).

### **2.3.3. Logistic regression**

Logistic regression is a very popular, statistically sound, probability-based classification algorithm that employs supervised learning. It was developed in the 1940s as a complement to linear regression and linear

discriminant analysis methods. Logistic regression is similar to linear regression in that it also aims to regress to a mathematical function that explains the relationship between the response variable and the explanatory variables using a sample of past observations (training data). Logistic regression differs from linear regression with one major point: its output (response variable) is a class as opposed to a numerical variable (Delen, 2014).

**3. RESEARCH METHOD**

**3.1. Data Preparation**

The dataset collected the customer base’s information. The company wants to automate the loan eligibility process (real-time) based on customer detail provided while filling out the online application form. These details are ID, Gender, Marital Status, Education, Self-employed, Number of Dependents, Applicant and Co-applicant Income, Loan Amount, Loan Amount Term, Credit History, Property Area.

The primary data are Applicant Income, Co-applicant Income. The secondary data are Self-Employed, Loan Amount, Loan Amount Term, Credit History, Property Area, Loan Status.

**Table 1. Data description**

	Self_Employed	ApplicantIncome	CoapplicantIncome	LoanAmount	Loan_Amount_Term	Credit_History	Property_Area	Loan_Status
count	582	614.000.000	614.000.000	592.000.000	60.000.000	564.000.000	614	614
unique	2	NaN	NaN	NaN	NaN	NaN	3	2
top	No	NaN	NaN	NaN	NaN	NaN	Semiurban	Y
freq	500	NaN	NaN	NaN	NaN	NaN	233	422
mean	NaN	5.403.459.283	1.621.245.798	146.412.162	34.200.000	842.199	NaN	NaN
std	NaN	6.109.041.673	2.926.248.369	85.587.325	6.512.041	364.878	NaN	NaN
min	NaN	150.000.000	0	9.000.000	1.200.000	0	NaN	NaN
max	NaN	81.000.000.000	41.667.000.000	700.000.000	48.000.000	1.000.000	NaN	NaN

Table 1 displays the parameters such as mean, standard deviation, min, max and respective percentage of some variable. Exploring all the variables in the data, it is important to fill missing values and deal with outliers because missing data and outliers can adversely affect the performance of the model. Listing out feature-wise count of missing values:

**Table 2. Missing values**

Loan_ID	0
Gender	13
Married	3
Dependents	15
Education	0
Self_Employed	32
ApplicantIncome	0
CoapplicantIncome	0
LoanAmount	22
Loan_Amount_Term	14
Credit_History	50
Property_Area	0
Loan_Status	0

**Table 3. Data after handle with null values**

Loan_ID	0
Gender	0
Married	0
Dependents	0
Education	0
Self_Employed	0
ApplicantIncome	0
CoapplicantIncome	0
LoanAmount	0
Loan_Amount_Term	0
Credit_History	0
Property_Area	0
Loan_Status	0

Some missing values in Gender, Married, Dependents, Self\_Employed, LoanAmount, Loan\_Amount\_Term and Credit\_History features shown in table 2. To handle missing values, for numerical variables: imputation using mean or median, for categorical variables: imputation using mode. Finally will get a dataset with no null value in table 3.

However, due to these outliers, figure 1 shows the bulk of the data in the loan amount is at the left and the right tail is longer. This is called right skewness. One way to remove the skewness is by doing the log transformation and taking its distribution in figure 2. As taking the log transformation, it does not affect the smaller values much, but reduces the larger values. Next, creating a column of LoanAmount\_log.

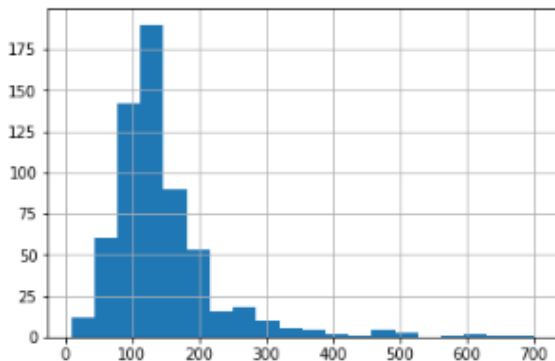


Figure 1. LoanAmount

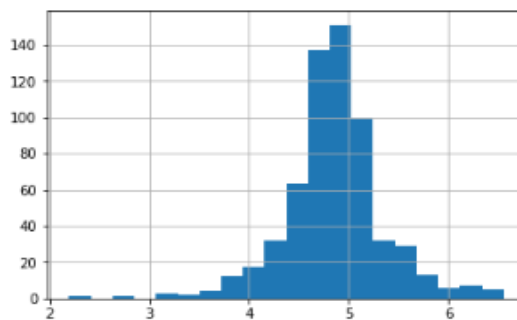


Figure 2. LoanAmount\_log

Based on the domain knowledge, this can come up with new features that might affect the target variable. Let's create some new features:

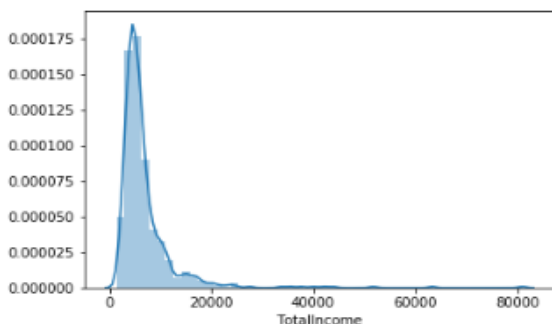


Figure 3. Total Income

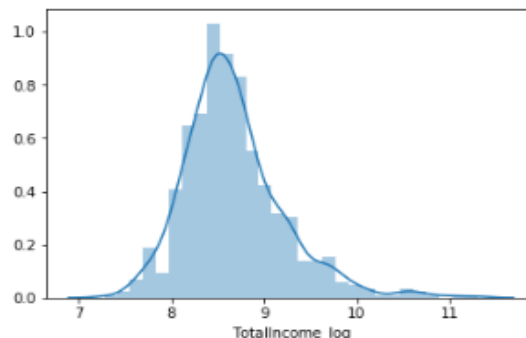


Figure 4. Total Income\_log

Total Income in figure 3 - combines the Applicant Income and Coapplicant Income. If the total income is high, chances of loan approval might also be high. However, it is shifted towards left, the distribution is right skewed. So, taking the log transformation to make the distribution normal as LoanAmount\_log seen in figure 4.

Table 4 indicates the EMI - EMI is the monthly amount to be paid by the applicant to repay the loan. Idea behind making this variable is that people who have high EMI's might find it difficult to pay back the loan. EMI can be calculated by taking the ratio of loan amount with respect to loan amount term.

Table 4. EMI

	EMI
0	355.556
1	355.556
2	183.333
3	333.333
4	391.667
5	741.667

Table 5. Balanced Income

	Balance_Income
0	5.493.444.444
1	5.735.444.444
2	2.816.666.667
3	4.607.666.667
4	5.608.333.333
5	8.871.333.333

Table 5 shows Balance Income - this is the income left after the EMI has been paid. Idea behind

creating this variable is that if this value is high, the chances are high that a person will repay the loan and hence increase the chances of loan approval.

It is necessary to remove the variables which used to create these new features. Because the correlation between those old features and these new features will be very high and logistic regression assumes that the variables are not highly correlated. Removing correlated features will help reduce noise. The removed variables are: ApplicantIncome, CoapplicantIncome, LoanAmount, Loan\_Amount\_Term. Besides, the “Loan\_ID” variable as it does not have any effect on the loan status so it has to be removed.

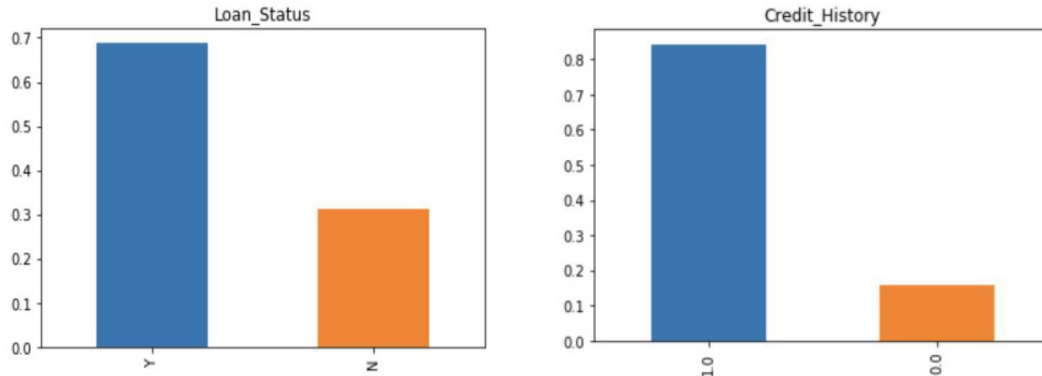
After all, because of the small dataset, which has oversampling on. Oversampling is a resampling scheme where modifies the distribution of a variable in the dataset by artificially increasing the number of observations that take on a particular value or range of values for that variable. In most cases, this is done by looking at what values are underrepresented in the dataset and artificially increasing the number of observations that take on that value or range of values.

### 3.2. Exploratory Data Analysis (EDA)

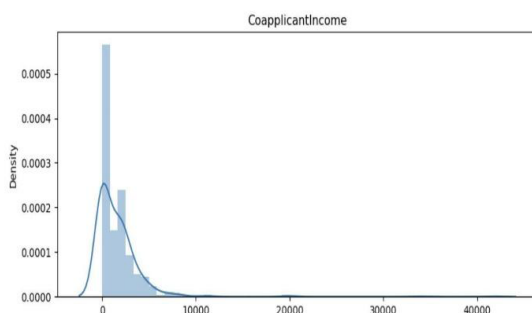
#### 3.2.1. Visualize the data

First, look at the target variable - Loan\_Status in figure 5. As it is a categorical variable, let us look at its frequency table, percentage distribution and bar plot. Frequency table of a variable will give us the count of each category in that variable. Among 614 Loan\_Status, there are 422 Yes and 192 No. It means around 69% applicants have been approved.

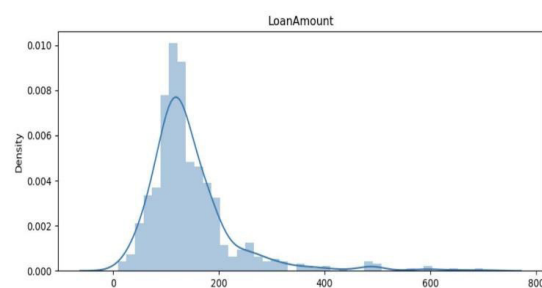
**Figure 5. Analysis on “Loan\_Status”, “Credit\_History”**



In the train dataset, Credit\_History, around 84% applicants have repaid debts. Credit\_History will have a great influence on each candidate, those who have borrowed and paid back will have higher trust and be hired.



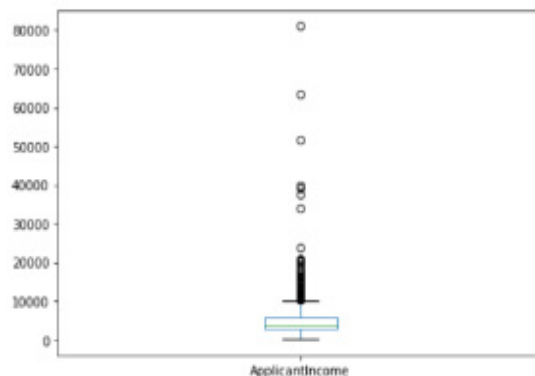
**Figure 6. LoanAmount**



**Figure 7. CoapplicantIncome**

The method of determining the customer's ability to repay debt is based on the customer's characteristics such as customer income and loan. Through analysis of the histogram displayed in figure 6 and 7, knowing the "Co-applicant Income" and "Loan Amount" of all customers.

From figure 8 below, it can be inferred that most of the data in the distribution of applicant income is towards the left which means it is not normally distributed.



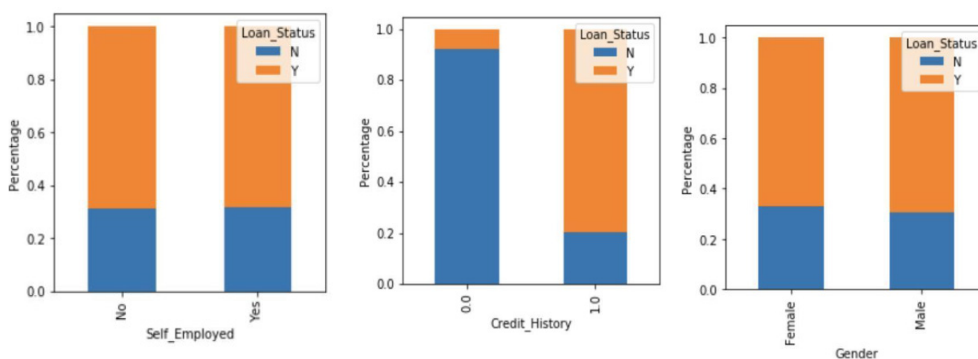
**Figure 8. "ApplicantIncome" distribution**

The boxplot confirms the presence of a lot of outliers/extreme values. This can be attributed to the income disparity in the society. It shows a similar distribution as that of the applicant income. Majority of coapplicant's income ranges from 0 to 5000. There are a lot of outliers in the coapplicant income and it is not normally distributed.

Some of the hypotheses:

- Applicants with high income should have more chances of loan approval.
- Applicants who have repaid their previous debts should have higher chances of loan approval.
- Loan approval should also depend on the loan amount. If the loan amount is less, chances of loan approval should be high.
- Lesser the amount to be paid monthly to repay the loan, higher the chances of loan approval.

Let's try to test the above mentioned hypotheses using bivariate analysis.



**Figure 9. Relation between "Loan\_Status" and "Gender", "Self\_Employed", "Credit\_History"**

In figure 9, the Loan approval and rejection cases are nearly similar for Gender and Self-Employed. So, these features do not have a significant impact on the Loan\_Status. The graphs show that loan approval is virtually gender-neutral, so male and female applicants are equally likely to be approved. The same goes for those who are self-employed or not.

For Credit\_History, the Loan approvals are more in case of Applicants having Credit History. Therefore, this feature has a significant impact on Loan\_Status. The figure 10 below shows a correlation of variables in the dataset.

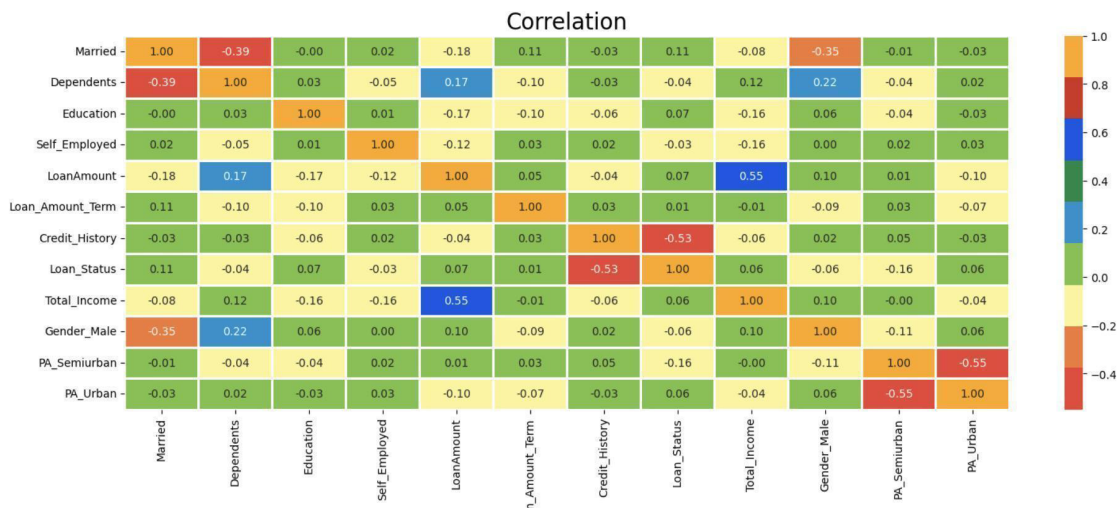


Figure 10. Matrix Correlation

- Chances of loan approval for higher amounts increase with increase in the total income of the applicant.
- Credit History has significant impact on loan approval
- Features Loan\_ID, Gender, Married, Dependents, Education, Self\_Employed and Property Area has little impact on loan approval.
- Majority of the loans were approved where the term is 180 or 360.

### 3.3. Individual model

#### 3.3.1. Decision tree

Decision tree is used to classify, then using the function to calculate values like Confusion Matrix, Accuracy, Precision, Recall, F1 score, Sensitivity, and Specificity to evaluate the results of the used model. Calculate results are displayed below:

Table 6. Metrics of DT

Metric	Value
Accuracy	0.7362
Precision	0,7328
Recall	0.7025
F1-score	0.7173
Sensitivity	0.7025 (error = 0.2975)
Specificity	0.7669 (error = 0.2331)

From table 6, the accuracy of this model shows that the predictive model is quite good with the result of 73.62%. Precision is 73.28% and Recall is 70.25%. The F1 score of 71.73% shows that the precision and recall of this classification model are also quite good. Sensitivity 70.25% and Specificity 76.69%, meaning that accurately identifying individuals with consent and without consent are good.

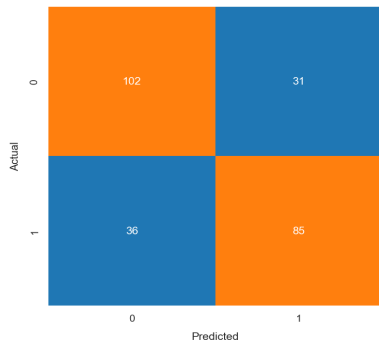


Figure 11. Confusion matrix of DT

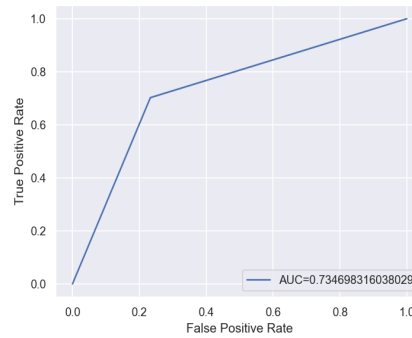


Figure 12. ROC/AUC curve of DT

The Confusion Matrix in figure 11 shows that there are 85 predictions True Positive, 102 True Negative, 36 False Negative and 31 False Positive. As can be seen from figure 12 of the AUC (representing the classification level of the model) of this model is 0.735. This indicates that the data classification model is considered acceptable.

3.3.2 Random forest

RF fits many classification trees to a data set, and then combines the predictions from all the trees. The algorithm begins with the selection of many bootstrap samples from the data (Cutler et al., 2007).

Table 7. Metrics of RF

Metric	Value
Accuracy	0.8228
Precision	0.8275
Recall	0.7933
F1-score	0.81
Sensitivity	0.79 (error = 0.21)
Specificity	0.85 (error = 0.15)

From table 7, the accuracy of this model indicates that the model is correctly predicting the outcome 82.3% of the time. Given a model with precision 82.8% and recall 79%, this means that out of all the samples predicted as positive by the model, 82.8% of them are actually positive, and the model was able to identify 79% of all the positive samples. F1 score of 81% indicates that the precision and recall for a binary classification model are both relatively moderate. A sensitivity of 79% and a specificity of 85%, it is both good at correctly identifying individuals who have the approval and at correctly identifying individuals who do not have the approval.

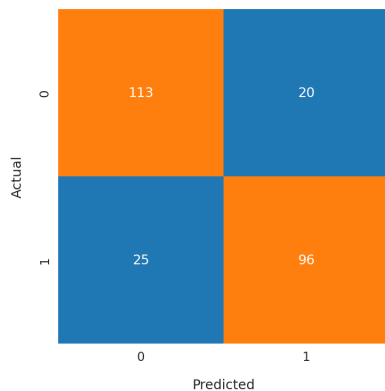


Figure 13. Confusion matrix of RF

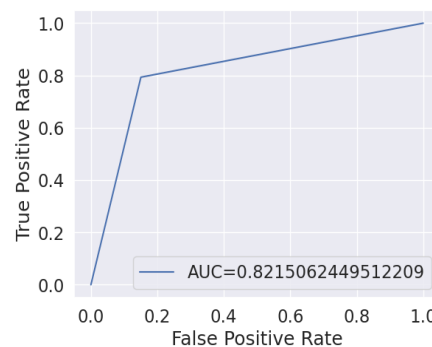
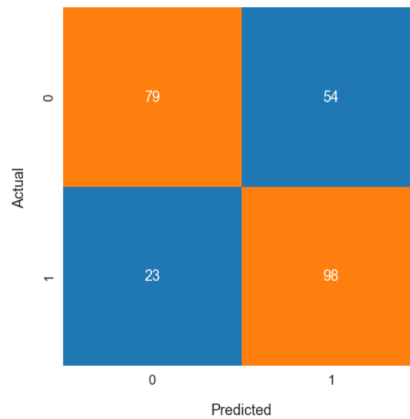


Figure 14. ROC/AUC curve of RF

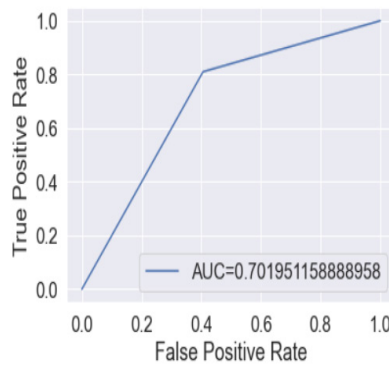
The confusion matrix in figure 13 shows that there are 113 True Negative, 96 True Positive, 20 False Negative and 25 False Negative. In figure 14, the AUC of this model is 0.821. This indicates that the data classification model is good.

**3.3.3. Logistic regression**



**Figure 15. Confusion matrix of LR**

From the Confusion Matrix in figure 15: there are 119 predictions True Positive, 21 True Negative, 5 False Positive and 40 False Negative.



**Figure 16. ROC/AUC curve of LR**

Figure 16 shows that the AUC for this ensemble model turns out to be 0.7. It means that the positive class has a greater prediction probability than the negative class.

**Table 8. Metric of LR**

Metric	Value
Accuracy	0.7
Precision	0.64
Recall	0.81
F1-score	0.71
Sensitivity	0.75 (error = 0.25)
Specificity	0.6 (error = 0.4)

As can be seen from table8, the accuracy of this model indicates that the model is correctly predicting the outcome 70% of the time. Given a model with precision 64% and recall 81%, this means that out of all the samples predicted as positive by the model, 70% of them are actually positive, and the model was



able to identify 64% of all the positive samples. F1 score of 71% indicates that the precision and recall for a binary classification model are both relatively moderate. A sensitivity of 81% and a specificity of 60%, it means that it is good at correctly identifying individuals who have the approval, but not good at correctly identifying individuals who do not have the approval.

### 3.4. Combination model

#### 3.4.1. Random forest and Logistic regression

Stacking is an ensemble method used in machine learning where the predictions of several models are combined to improve the final prediction. In stacking, multiple base models are trained on the same training set, and then a meta-model is trained to predict the final outcome using the outputs of the base models as input.

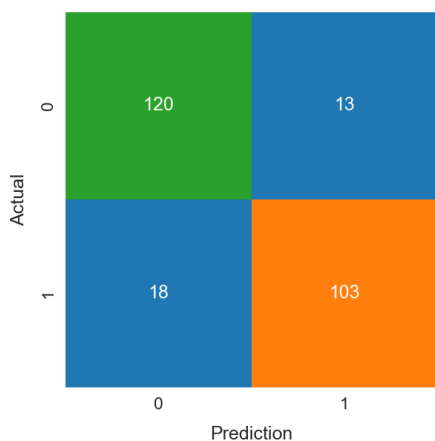
After analyzing data with the model, the results about all the metrics are shown below.

**Table 9. Metrics of ensemble of RF and LR**

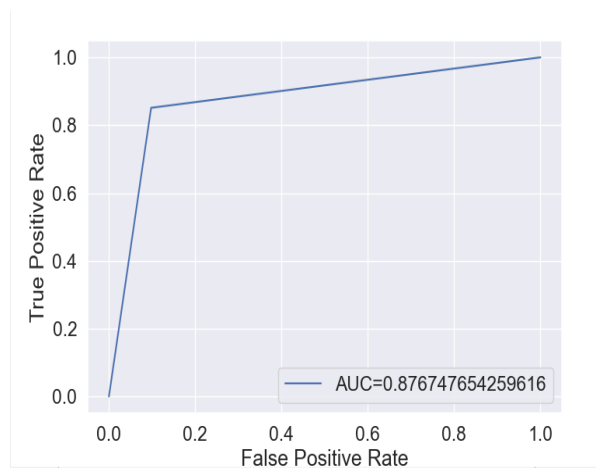
Metric	Value
Accuracy	0.8779
Precision	0.8879
Recall	0.8512
F1-score	0.8692
Sensitivity	0.8512 (error = 0.1488)
Specificity	0.9023 (error = 0.0977)

As can be seen from table 9, the accuracy of this model indicates that the model is correctly predicting the outcome 87.79% of the time. Given a model with precision 88.79% and recall 85.12%. Means the model has a high recall and a moderate precision, meaning that many positive samples were correctly identified, but there were also a relatively significant number of false positives. F1 score of 86.92% indicates that the precision and recall for a binary classification model are both relatively high. A sensitivity of 85.12% and a specificity of 90.23%, it means that it is both good at correctly identifying individuals who have the approval (high sensitivity) and at correctly identifying individuals who do not have the approval (high specificity).

From the Confusion Matrix in figure 17, there are 103 predictions True Positive, 120 True Negative, 18 False Negative and 13 False Positive. Figure 18 indicates the AUC for this ensemble model is 0.88, it is pretty high, nearly 1. This shows that this data classification model is quite good.



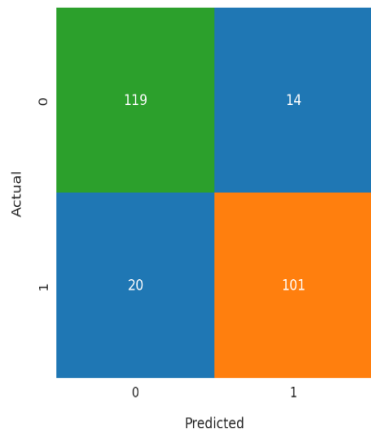
**Figure 17. Confusion matrix RF and LR**



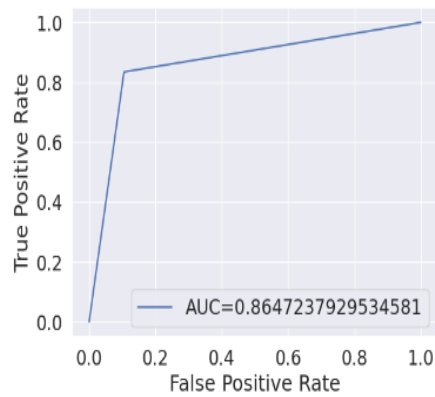
**Figure 18. ROC/AUC curve of RF & LR**

**3.4.2. Decision tree and Logistic regression**

After analyzing data with the model, the results about all the metrics are shown below.



**Figure 19. Confusion matrix of DT and LR**



**Figure 20. ROC/AUC curve of DT & LR**

From the Confusion Matrix in figure 19, there are 103 predictions True Positive, 119 True Negative, 18 False Negative and 14 False Positive. From figure 20, AUC for this ensemble model turns out to be 0.86. It is pretty high, this indicates that this data classification model is quite good.

**Table 10. Metrics of ensemble of DT and LR**

Metrix	Value
Accuracy	0.8661
Precision	0.8783
Recall	0.8347
F1-score	0.8559
Sensitivity	0.8347 (error = 0.1653)
Specificity	0.8947 (error = 0.1053)

Table 10 shows that in this case, the model achieved an accuracy of 0.8661, which means that it correctly classified 86.61% of the instances. Precision is 0.8783, which means that of all the instances it classified as positive, 87.83% were actually positive. Recall is 83.47% identified that percent of all the actual positive instances. The F1-score of the model is pretty high. In this case, the model achieved a specificity of 0.8947, which means that it correctly identified only 89.47% of all the actual negative instances.

**4. RESULTS AND DISCUSSION**

**4.1. Results**

**4.1.1. Evaluation**

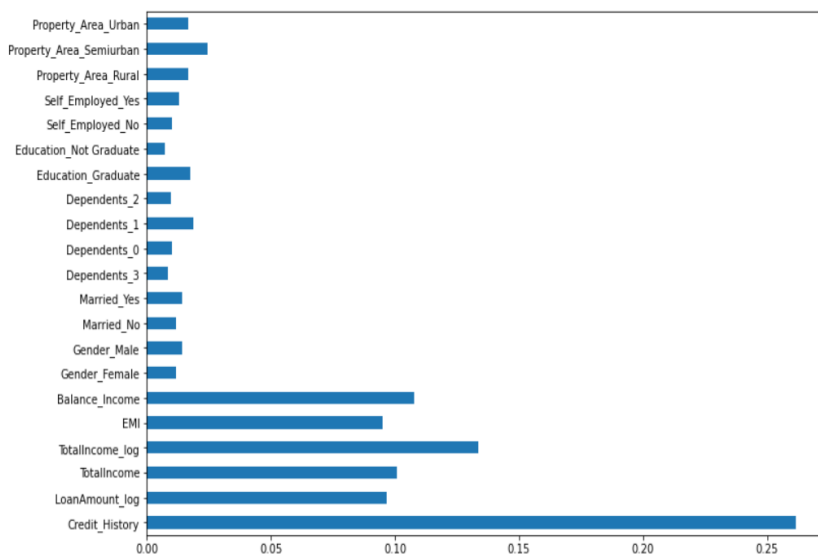
**Table 11. Prediction for five model types**

Model	Accuracy	Precision	F1-score	Sensitivity	Specificity	AUC
DT	0.7362	0.7328	0.7173	0.7025	0.7669	0.7347
RF	0.8228	0.8275	0.81	0.7933	0.85	0.8215
LR	0.7	0.64	0.71	0.8	0.6	0.7
LR+RF	0.8779	0.8879	0.8692	0.8512	0.9023	0.8767
LR+DT	0.8661	0.8783	0.8559	0.8347	0.8947	0.8647

Table 11 shows the prediction figures for all five model types. It can be seen that the combination of Logistic Regression and Random Forest get higher metrics than the others. Overall, the two combined models used in this paper increased the results more than the models used alone. Among them, the combined model of logistic regression and random forest gave the best results.

#### 4.1.2. Important features

The term “Importance features” relates to methods for scoring each input feature for a certain model; the scores merely indicate the “importance” of each feature. A higher score indicates that the particular characteristic will have more of an impact on the model being used to forecast a particular variable.



**Figure 21. Importance features**

From figure 21, it can be seen that the least influential features group include Property\_Area Urban, Property\_Area\_Rural, Self\_employed, Education, Dependent, Married, Gender. In short, these features do not have an impact on the prediction model and they are not the important feature to evaluate a candidate who wants to make loans in a bank or finance company.

The moderate influential features group include LoanAmount\_log, TotalIncome TotalIncome\_log, EMI, Balance\_Income and the highest influential feature is Credit History. In short, these features have a high impact on the prediction model and they are an important feature to evaluate a candidate who wants to make loans in a bank or finance company.

In summary, from evaluating the influence of features, businesses can analyze customer segmentation and make a suitable plan to promote campaigns for each type of customer. They also early identify customers who do not have ability to repay or not.

#### 4.2. Discussion

This study explores the repayment capacity of customers and identifies the variables that affect the repayment capacity. Applying different machine learning algorithms helps decide which model will be the best to apply to the data set in order to get the results with the highest metrics.

The research consists of five models and when looking at the results in detail, the metrics of each model will all give different results. As can be seen, the results are quite good because the accuracy ranges from 70-88% for all models. However, when dealing with unbalanced data for the response variable, accuracy alone is not enough to draw conclusions. Instead, it has to compare to other performance metrics such as

sensitivity, DT (70%) showed the worst performance, followed by RF with 79%, then LR (80%), followed by LR+DT (83%), and finally LR+RF with 85%, which shows the best results.

Next is the comparison of AUC, LR is ranked last with AUC of 0.7 and DT has AUC of 0.73, followed by RF of 0.82, both LR+DT and LR+RF combined models continue to give high results, respectively 0.86 and 0.88. To compare sensitivity and specificity, LR+RF gives the most promising results, with a sensitivity of 0.85 and specificity of 0.9, these show that this ensemble model is good at correctly identifying individuals who have the approval (high sensitivity) and at correctly identifying individuals who do not have the approval (high specificity). Research results show that there is a strong correlation between customers' delayed payback rate and their income, number of loans and current debt levels.

In particular, it is essential to combine data from a variety of sources as most debt repayment studies use only a single survey sample for data collection. In the future, it will be required to combine information from other sources, including management, professional organizations and credit unions, to get a complete picture of a customer's ability to repay

## **5. CONCLUSION AND FUTURE WORK**

In recent years, the loan industry is growing in popularity, and many individuals are applying for loans for a variety of reasons. However, there are instances where people fail to pay back the majority of their loans to the bank, which causes them to suffer a significant financial loss. Consequently, it would considerably reduce the financial loss if there was a mechanism to effectively categorize the loaners beforehand.

This study showed how to forecast loan repayment ability using machine learning techniques on a very financial history dataset. Prior to performing the exploratory data analysis and feature engineering, the dataset was cleansed. It was discussed how to cope with both missing values and unbalanced data sets. The study used various different techniques. Through studies, it has been discovered that the model combines random forest and logistic regression accurately suit the situation the best. Using Machine Learning in predicting customer solvency offers a number of benefits over traditional methods.

- Processing Complex Data: Machine Learning can process and analyze large amounts of data from a variety of sources, including financial information, credit records, customer behavior, and social data. This helps to create more accurate predictive models and provides more detailed information about the customer's ability to pay.

- Machine learning is not as biased by human emotions or subjective opinions. One of the biggest disadvantages of traditional methods of forecasting is that they are biased by human emotions and subjective opinions. This can lead to inaccurate predictions, as humans are often swayed by their personal biases and emotions.

- Automation and optimization: Machine Learning enables the automation of the solvency prediction process, from data collection and preprocessing to model building and evaluation. It can also optimize the model parameters to achieve the best performance.

In the future, further research can focus on other input variables such as information about credit history, income, number of years worked, loan purpose and many other factors to increase the accuracy of the survey, predictive model for debt repayment. In addition, using other techniques such as Neural Networks or Deep Learning to build more complex predictive models, with big data processing and automatic learning capabilities. Another important aspect is dealing with data imbalance problems. In the problem of predicting the repayment capacity, there is often a data imbalance when the number of paying customers is much lower than the number of non-paying customers. This can lead to inaccurate prediction

models due to the lack of information about the group of debtors. One way to solve this problem is to use undersampling or oversampling to rebalance the data. Finally, new technologies such as Blockchain or Big Data can be applied to improve the management and analysis of data related to the customer's ability to repay. Using Blockchain can help increase the transparency and trustworthiness of credit data, while using Big Data can help uncover hidden relationships and trends in the data to develop better solutions. more robust predictive model.

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## TESTING AND MEASUREMENT OF ASYMMETRIC INFORMATION: EMPIRICAL EVIDENCE FROM COMPANIES LISTED ON THE HO CHI MINH CITY STOCK EXCHANGE

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**ABSTRACT:** A failed market, or asymmetric information, is a well-known economic concept. This phenomenon can be witnessed in a variety of markets. However, the repercussions of information asymmetry are thought to be more substantial in the stock market. Because, in addition to measurable economic impact, knowledge asymmetry harms trust. The Vietnamese stock market has experienced several successes since its creation, yet it still has many restrictions typical of a young market. The numerous violations of the subjects on the market in recent years reflect those restrictions. Information issues, or more broadly, information asymmetry, are primarily responsible for these errors. The goal of this study was to analyze and assess the degree of information asymmetry in the Vietnamese stock market during a five-year period (2018 – 2022). The author tests the information asymmetry effect using GARCH models for VN-Index data and measures Adverse Selection Component (ASC) using the Glosten & Harris model for the 100 largest capitalization companies on the Ho Chi Minh City Stock Exchange (HOSE). The findings demonstrate information asymmetry, and the ASC value for the entire study period is 89.53%. This empirical finding serves as the foundation for formulating suitable policy recommendations for every market participant, aiding in the growth of a productive, equitable, open, and transparent Vietnamese stock market.

**Keywords:** Stock market, Asymmetric Information, Glosten & Harris model, ARCH/GARCH model.

### 1. INTRODUCTION

The stock market in Vietnam was born late and officially began operations just over 22 years ago on July 28, 2000, not a very short time but also not too lengthy. Vietnam's stock market has made numerous milestones while carrying out its functions. The Vietnamese stock market, on the other hand, nevertheless exhibits many of the inherent limits and flaws of a market that is deemed rudimentary and fledgling. Individual investors bear the largest risks and losses, particularly those resulting from the mistakes of other market participants, although their vast number and significant contribution to trading volume. Individual investors' main risks in Vietnam's stock market in recent years have been primarily tied to information factors. One of the root issues to explore is the problem of information transparency, or the fact that actors have unequal amounts of information, often known as asymmetric information. The study's goal is to examine and measure the extent of asymmetric information in transactions on the Vietnamese stock exchange using adverse selection component. The author then develops suitable policy implications for each target group in order to reduce the impact of asymmetric information.

*Akerlof (1970)* was the first to investigate information asymmetry through an examination of the used automobile market. *Spence (1973)*, extending Akerlof's theory, investigates this problem in the labor market and proposes signaling to lessen information asymmetry in hiring. *Stiglitz (1975)* applies Spence's theory to offer a screening system for successfully grouping and paying workers. Later studies, such as *Glosten & Harris (1988)*, *George et al. (1991)*, *Kim & Ogden (1996)*, *Huang & Stoll (1997)*, sought to evaluate the degree of information asymmetry by using quantitative models. Then, in the study of *Van Ness et al. (2001)*, *Giouvris & Philippatos (2008)*, these models were tested with real stock market data. The concept of

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information asymmetry is a reasonably frequent research topic in domestic studies. The authors investigate information asymmetry in a variety of industries, including insurance, labor, and agricultural products, although the majority of their studies focus on information asymmetry in the stock market. *Hoang (2004)* was one of the first to propose utilizing a group of models with variable variance (ARCH/GARCH) to find information asymmetry effects. *Khang (2007)* and *Hoai & Khang (2008)* both focus on understanding econometric models used to quantify information asymmetry. *Thuan (2009)*, *Mo (2009)* and *Huyen (2011)* investigate the existing status and potential remedies to reduce information asymmetry in the Vietnamese stock market. *Dinh (2012)*, *Thom (2013)*, *Gam (2013)* and *Tu (2013)* study the determining variables and effects of information asymmetry on entities and the stock market. *Ngai et al. (2016)*, *Anh (2021)* and *Phan (2021)* presented and empirically evaluated a model for the degree of information asymmetry in the Ho Chi Minh City stock market.

In general, theoretical, qualitative, and quantitative research on the impacts of information asymmetry, particularly information asymmetry in the stock market, is fairly established. The authors described the existing situation, the elements that influence it, quantified the extent of information asymmetry, and provided methods to mitigate the impact. However, the majority of quantitative studies on information asymmetry merely perform, or test for, information asymmetry, or just assess information asymmetry using adverse selection component to develop models of influence variables. Furthermore, because stock trading data is updated daily, the scope of prior authors' research is frequently between 6 months and each year, which is sporadic owing to the magnitude of the data. As a result, the author employs stock trading data from 2018 to 2022 in this analysis. To assess the information asymmetry effect, GARCH models were applied to VN-Index data, and Glosten & Harris model were used to measure the adverse selection component for the group of 100 highest capitalization companies on HOSE.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Market Failure and Asymmetric Information**

#### **2.1.1. Market Failure**

Efficient resource allocation is a critical need of every economy. The potential distribution is determined by the economy's technology and resources. Different people will have different opinions on efficiency and fairness; the common denominator is Pareto efficiency. For a given set of consumer preferences, resources, and technology, a Pareto optimal distribution would make some people wealthy if they did not have the capacity to migrate to a different distribution. without anyone becoming broke. When all markets are perfectly competitive, the supply-demand equilibrium will be Pareto efficient (Stiglitz & Rosengard, 2015).

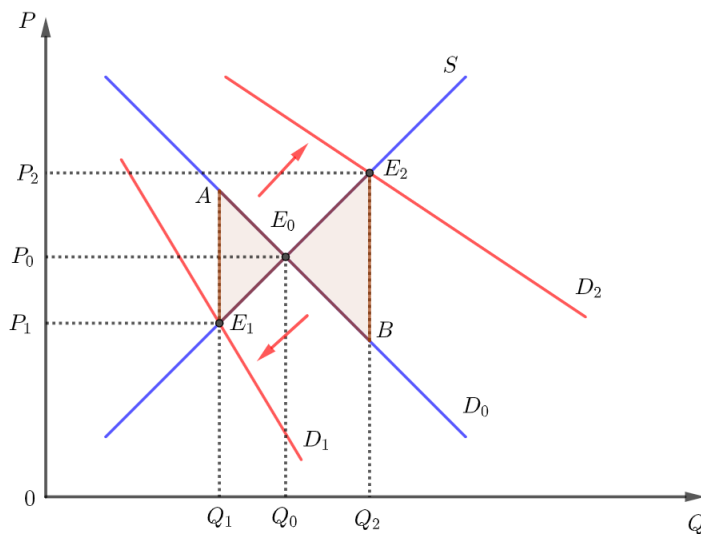
Competitive equilibrium is an efficient state when there is no distortion. *Begg et al. (2014)* define "market failure" as circumstances in which market equilibrium is inefficient. These distortions prohibit the "invisible hand" from allocating resources efficiently. As a result, the causes of market failure include: imperfect competition, public goods, externalities, and information asymmetry. To overcome these flaws in the market system, today's modern economies are a hybrid of the "invisible hand" and the "visible hand". Operating the economy only through market mechanisms or state regulation is like to clapping with one hand (Samuelson, 1915).

#### **2.1.2. Asymmetric in economics**

Akerlof's "The market for lemons: Quality uncertainty and the market mechanism" in 1970 was the first to present the theory of information asymmetry. Asymmetric information occurs when one side in a market transaction has more and better information than the other. Disparities in information put pressure

on businesses to distort transactions. Although the idea of information asymmetry has only been around since the 1970s, it was verified when three economists studying it, George Akerlof, Michael Spence, and Joseph Stiglitz, were awarded the Nobel Prize in Economics in 2015.

The asymmetric information model assumes that at least one party to the transaction has superior information than the other(s), or that one party can influence, respond, or demand terms that affect the initial transaction agreement while the other(s) cannot. According to Akerlof, information asymmetry will result in the establishment of a market with many “bad” items, while excellent ones will be excluded. The cash market manifests itself in a variety of markets, including labor, banking, real estate, insurance, securities, used furniture, and so on.



**Figure 1. Economical effect of Asymmetric Information**

Source: The author draws by Geogebra

The economy is initially in equilibrium at point E<sub>0</sub> in Figure 1, with price P<sub>0</sub> and output Q<sub>0</sub>. If an exchange rate influences the demand side, shifting the curve to the left, the new equilibrium point will be E<sub>1</sub>. At E<sub>1</sub>, the pricing is P<sub>1</sub> < P<sub>0</sub> and the output is Q<sub>1</sub> < Q<sub>0</sub>. As a result of the old equilibrium, the total social residual loses the area of triangle E<sub>0</sub>E<sub>1</sub>A (a waste of time). Similarly, if asymmetric knowledge causes the demand curve to move to the right, the welfare loss would be E<sub>0</sub>E<sub>2</sub>B in a triangle analysis. To summarize, information asymmetry in both of these circumstances leads to society’s poor use of consumption, resulting in a loss of profits to the economy.

Asymmetric information is a market failing those results in the following outcomes:

+ **Adverse Selection:** When participants in a transaction purposefully withhold information, purchasers lack accurate and complete knowledge and give a price willing to pay less than the true value of the items. As a result, vendors lose the incentive to produce high-quality goods and instead supply things of poor quality. As a result, low-quality items – “lemons” – pushed high-quality goods out of the market (Akerlof, 1970).

+ **Moral Hazard:** A situation that emerges after a transaction has concluded in which one party plans to conceal information that is difficult for the other party to control or will cost a lot of money to control. The fact that the party with the advantage of information no longer has the incentive to try or act as rationally as before the transaction occurs makes the less informed party fearful of their own risk of loss (Thom, 2013).

+ **Principle – Agent:** A client-agent dilemma occurs when one party (the principal) hires another (the representation) to accomplish one or more specific goals. Because the executor makes it impossible for the



principle to enforce, evaluate, or support the work, the executor pursues a different aim than the principal. This is due to the interaction of both unfavorable selection and moral hazard (Nga, 2020).

## 2.2. Models for testing and measurement asymmetric information

### 2.2.1. Models to test information asymmetry effects

There has been a great deal of effort towards developing models with variable variance, beginning with Engle's ARCH (1982). Engle (1982) was the first to establish a theoretical foundation for risk modeling. ARCH (Autoregressive Conditional Heteroscedastic) is a variable variance autoregressive model. The model's central idea is that the variance of the residuals across time is proportional to the square of the residuals at earlier points in time. As a result, we will estimate both a mean equation and an equation of variance at the same time. Consider the following simple model:  $Y = \alpha + \beta X_t + u_t$  with  $[X_t]$  is the explanatory variable vector and  $[\beta]$  is the regression coefficients vector. According to the premise of the least squares approach  $u_t \sim N(0; \sigma^2)$ . However, Engle permits the incorrect approach to vary in real time depending on its precision:  $\sigma_t^2 = \lambda_0 + \lambda_1 u_{t-1}^2$ . Bollerslev (1986) extended the ARCH model by including the conditional variance's lag variable in the variance equation, resulting in the Generalized Autoregressive Conditional Heteroscedastic (GARCH) model. The GARCH model's variance equation (1,1):  $\sigma_t^2 = \lambda_0 + \lambda_1 u_{t-1}^2 + \delta_1 \sigma_{t-1}^2$  (Das, 2019). If the residual delay in the ARCH effect test is too large, it will undermine the reliability of the estimation findings by limiting the number of degrees of freedom in the model. Because this problem is difficult to solve for short time series, GARCH models are more widely utilized in risk forecasting (Hoai et al., 2009).

The ARCH/GARCH risk prediction models have been heavily modified from the original Engle and Bollerslev models. This group includes the exponential GARCH model (EGARCH), the mean GARCH model (GARCH-M), the threshold GARCH model (TGARCH), the power ARCH model (PARCH), and the integrated GARCH model (IGARCH). EGARCH and TGARCH are examples of asymmetric models used to investigate the asymmetric effect of shocks.

To overcome the GARCH model's limitation of being unable to distinguish between the effects of negative and positive shocks, as well as the requirement that the coefficient of the variance equation be non-negative, Nelson (1991) proposes the EGARCH model with the assumption that For random variables with an exponential distribution, the variance equation of EGARCH (1,1) is as follows:

$$\ln(\sigma_t^2) = \omega + \alpha \left( \frac{|u_{t-1}|}{\sqrt{\sigma_{t-1}^2}} - \sqrt{\frac{2}{\pi}} \right) + \beta \ln(\sigma_{t-1}^2) + \gamma \frac{u_{t-1}}{\sqrt{\sigma_{t-1}^2}} \quad (1)$$

The left-hand side of (3) is the natural logarithm of the conditional variance, suggesting that the leverage effect of the shocks is exponential rather than quadratic as in the original GARCH model, and that even if the parameters are negative,  $\sigma_t^2$  will be positive (Tsay, 2005). If  $\gamma \neq 0$  and  $\gamma < 0$  indicate a negative shock that is stronger than a positive shock, then information asymmetry or information asymmetry exists.

With the assumption that shocks have asymmetric effects in mind, the TGARCH model includes a dummy variable into the variance equation that defines negative and positive shocks. TGARCH (1,1) has the following variance equation:

$$\sigma_t^2 = \omega + \alpha u_{t-1}^2 + \beta \sigma_{t-1}^2 + \gamma u_{t-1}^2 d_{t-1} \quad (2) \quad \text{with } d_t = \begin{cases} 1 & (u_t < 0) \\ 0 & (u_t > 0) \end{cases}$$

A positive shock (or good news, for  $u_t > 0$ ) and a negative shock (or terrible news, for  $u_t < 0$ ) affect the conditional variance differently in the TGARCH model. The partial effect of the good news will be  $\alpha$ , whereas the partial effect of the negative news will be  $(\alpha + \gamma)$ . If  $\gamma \neq 0$  occurs, then the asymmetry effect exists, and  $\gamma > 0$  demonstrates that negative news has a greater impact than good news (Rabemananjara & Zakoian, 1993; Zakoian, 1994).

### 2.2.2. Models for calculating adverse selection component

One of the effects of asymmetric information is adverse selection. We can quantify the degree of information asymmetry between investors for public companies by measuring the Adverse Selection Component (ASC). *Glosten & Harris (1988), George, Kaul & Nimalendran (1991), Lin, Sanger & Booth (1995), Kim & Ogden (1996), Huang & Stoll (1997)* are examples of popular econometric models for analyzing information asymmetry.

Glosten and Harris (1988) present one of the first trade indicator regression models for spread decomposition. The basic model is:  $\Delta P_t = c_0 \Delta Q_t + c_1 \Delta Q_t V_t + z_0 Q_t + z_1 Q_t V_t + \varepsilon_t$  (3). In there:

+  $\Delta P_t = P_t - P_{t-1}$ : The difference in price between time  $t$  and time  $t-1$ ;

+  $\Delta Q_t = Q_t - Q_{t-1}$ :  $Q_t$  is the stock trading index at time  $t$ , If it's a sale, receive value  $-1$ ; if it's a buy, gain value  $+1$ . However, there will be many continuous transactions in the same time period, making it impossible to determine  $Q_t$ . Thus, *Lee & Ready (1991)* identify:

$$Q_t = \begin{cases} +1 & (P_t > P_{t-1}) \\ -1 & (P_t < P_{t-1}) \\ Q_{t-1} & (P_t = P_{t-1}) \end{cases}$$

+  $V_t$ : Trading volume at time;

+  $c_0, c_1, z_0, z_1$ : Regression coefficients of model (3);

Glosten & Harris argue that the change in transaction price consists of 3 factors: Order cost, storage cost  $C = 2(c_0 + c_1 V_t)$ , and reverse selection cost  $Z = 2(z_0 + z_1 V_t)$ . With  $\bar{V}_t$  being the average trading volume, ASC is calculated as following formula:

$$ASC = \frac{\bar{Z}}{\bar{C} + \bar{Z}} = \frac{z_0 + z_1 \bar{V}_t}{(c_0 + c_1 \bar{V}_t) + (z_0 + z_1 \bar{V}_t)} \quad (4).$$

## 3. METHODOLOGY AND DATA

### 3.1. Research models

#### 3.1.1. GARCH model for testing asymmetric information effect

*Nelson (1991), Glosten et al. (1993), Rabemananjara & Zakoian (1993)* used the EGARCH, GARCH-M, and TARARCH models to show that bad news has a bigger impact on price factors on the US stock market than positive news. *Engle & Ng (1993)* compare and confirm the existence of information asymmetry in the Japanese stock market using a variety of models with variable variance conditions. However, a recent study utilizing the VECH-GJR model on the Taiwan stock market by *Chen & Anh (2020)* found no evidence of information asymmetry.

A few authors in Vietnam investigated and investigated the information asymmetry problem in the stock market. *Hoang (2004)* investigates the GARCH effect on the profitability of the Vietnamese stock market

from 2000 to 2003, demonstrating that negative news has a stronger, faster, and more direct influence than positive news. This outcome is consistent with similar research in developed markets. *Tien et al. (2017)*, *Anh (2021)* use data from the VN-Index to assess the asymmetry of news on the Vietnamese stock market using two models. The study then employs Akaike information criteria (AIC) and Bayesian information criteria (BIC) to select a superior model, concluding that there is an information asymmetry effect.

### 3.1.2. Glosten & Harris model for calculating adverse selection component

*Glosten & Harris (1988)*, *George et al. (1991)*, *Lin et al. (1995)*, *Kim & Ogden (1996)*, *Huang & Stoll (1997)* are all regularly used models with reliable estimation results. However, data on the closing price and the volume of matching transactions per day can only be acquired under certain situations. For the Vietnamese stock market, the types of prices and indexes in the models, and are not responsive and difficult to determine. With the Glosten and Harris model, this might be considered the “original” model as the foundation for the study path, employing the ASC of the price gap to evaluate the extent of information asymmetry in the stock market. This model is widely used, as evidenced by the studies of *Van Ness et al. (2001)*, *Park (2008)*, and others. As a result, the author believes that using Glosten and Harris’ approach to calculate ASC is appropriate with HOSE transactions. The coefficients  $c_0, c_1, z_0, z_1$  of the (3) model is obtained using the standard least squares regression technique.

### 3.2. Dataset

The study tests the existence of the information asymmetry effect on the Vietnamese stock market by using a group of conditional variance models that change through the daily closing price of the market representative index (VN-Index). After testing whether there really exists information asymmetry on the empirical data, the author continues to measure the level of information asymmetry by determining the ASC model for the group of 100 largest capitalization stocks listed on HOSE (VN100). The research process can be summarized by the diagram in Figure 2.

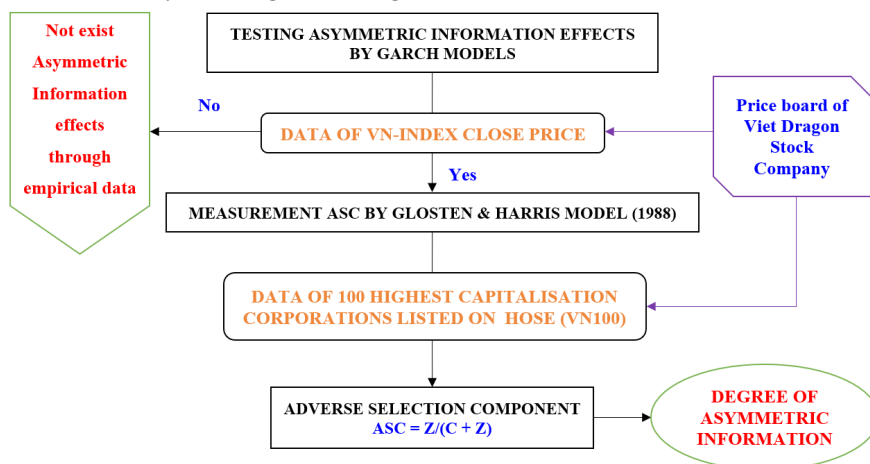


Figure 2. Research process of this paper

Source: The author draws by MS Word

#### 3.2.1. VN-Index for testing by GARCH models

The study employs secondary data, specifically the daily closing price of the VN-Index, to reflect the Vietnamese stock market over a five-year period spanning January 1, 2018 to December 31, 2022. The sample with this data is a time series of days with 1,249 observations. The study calculates the GARCH model group for the profitability of equities traded in the market to assess the information asymmetry effect. The dependent

variable is the percentage change in the VN-Index closing price:  $R_t = \ln\left(\frac{P_t}{P_{t-1}}\right)$ . In there:  $R_t$  is the rate of return of stocks on day  $t$ ,  $P_t$  and  $P_{t-1}$  is respectively, is the closing price of VN-Index on day  $t$  and  $t-1$ .

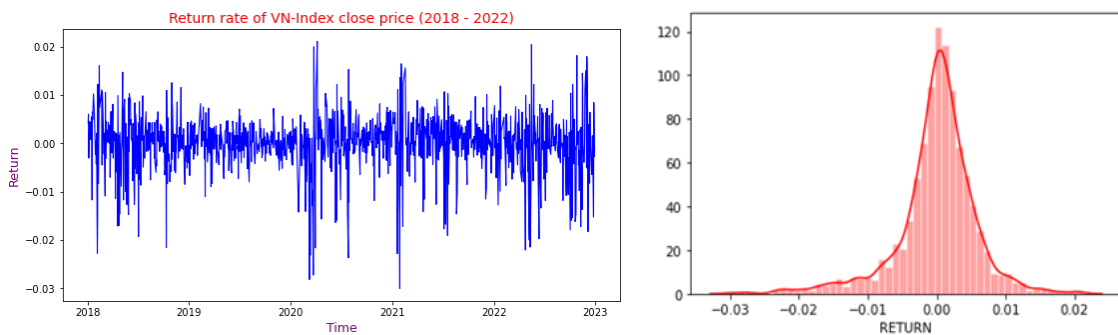
**3.2.2. VN100 for measurement by Glosten & Harris model**

The author calculates the ASC for stocks in the VN100 basket after checking for the existence of an information asymmetry effect using the VN-Index. However, because of the nature of the business and the structure of capital and assets, the author does not calculate for stocks of banks, securities companies, and insurance companies (Van Ness et al., 2001). The total number of companies analyzed is 78/100 of the highest capitalisation corporations listed on the Ho Chi Minh Stock Exchange. The price used to determine the spread is the daily closing price ( $P_{it}$ ) from January 1, 2018 to December 31, 2022. The total volume of matching transactions for the day ( $V_{it}$ ) is referred to as volume. Because it is impossible to establish whether the trading volume is from a seller or a buyer, the transaction index is legitimate according to Lee and Ready’s (1991) convention.

**4. RESULTS AND DISCUSSION**

**4.1. Descriptive statistics**

**4.1.1. VN-Index data**



**Figure 3. Descriptive statistics of VN-Index series**

Source: The author draws by Python

The graph on the left in Figure 3 depicts the yield series of the VN-Index over a 5-year period, demonstrating that the range of returns is  $(-0.03; 0.02)$ . The special profit fluctuated extremely much in the first quarters of 2020 and 2021, whereas the subsequent periods, despite swings, had fairly constant profit that only fluctuated around an average of 0. Graph of frequency with the density function of returns in the figure to the right depicts a random distribution of returns, however when compared to the balanced bell shape and parameters with the same Jarque-Bera test result, the series of returns does not match the normal distribution.

**4.1.2. VN100 data**

**Table 1. Descriptive statistics of variables in Glosten & Harris model**

Variable	Mean	Medium	Minimum	Maximum	Standard Error
$P_{it}$	36,426.64	24,228.80	2,575.60	289,000	33,879.99
$V_{it}$	2,394,031	856,700	0.0000	$1.65 \times 10^8$	4,649,556
$\Delta P_{it}$	0.0175	0.0000	-104,900	92,500	5,211.5633

$\Delta Q_{it}$	0.0002	0.0000	-2.0000	2.0000	1.3938
$\Delta Q_{it}V_{it}$	-319.5539	1730.0000	$-1.65 \times 10^8$	$1.66 \times 10^8$	7,185,475
$Q_{it}$	-0.0068	0.0000	-1.0000	1.0000	0.9688
$Q_{it}V_{it}$	250,081.5	0.0000	$-1.29 \times 10^8$	$1.65 \times 10^8$	5,159,617

The data on the VN100 companies is designed as a panel data set with 95,038 observations with a cross-section of 78 companies and a time series of days over 5 years. Among the variables observed are:  $P_{it}$ ,  $V_{it}$ ,  $\Delta P_{it}$ ,  $\Delta Q_{it}$ ,  $\Delta Q_{it}V_{it}$ ,  $Q_{it}$ ,  $Q_{it}V_{it}$ . Table 1 contains basic descriptive information regarding the variables. In addition to the dummy variable, all variables used to estimate the regression model by Glosten and Harris include random values ranging from negative to positive, indicating the daily increase and fall in stock prices. The price differential can reach 92,500 points on some days, but it can also fall dramatically from the previous day to 104,900 points.

#### 4.2. Result of testing asymmetric information effect

**Table 2. Unit root test**

Variable	Augmented Dickey-Fuller		Phillips-Perron	
	t-stat	p-value	Adj. t-stat	p-value
$R_t$	-33.1199	0.0000	-33.3158	0.0000

The results in Table 2 show that both the ADF and PP tests produce statistical values with p-value = 0.0000  $\ll$  0.01, indicating that hypothesis  $H_0$  is rejected and the VN-Index yield series is stationary at base-order of lag. The author then estimates a simple linear regression model with only constant variables to get residual series. The ARCH effect is tested using this residual series.

**Table 3. ARCH effect test**

ARCH-LM test			
F-stat	32.5980	p-value	0.0000
Regression with RESID <sup>2</sup>			
	Coef.	t-stat	p-value
C	$1.8 \times 10^{-5}$	6.9996	0.0000
RESID <sup>2</sup> (-1)	0.1433	5.0431	0.0000
RESID <sup>2</sup> (-2)	0.1444	5.0840	0.0000
RESID <sup>2</sup> (-3)	0.1424	5.0114	0.0000
RESID <sup>2</sup> (-4)	0.0349	1.2282	0.2196

If the data cannot reject the hypothesis  $H_0$  that the coefficients in the autoregressive model of variance are all zero, then there is no ARCH effect. When  $H_0$  is refused, there is an ARCH effect. Table 3 shows that the original hypothesis is rejected and that the series of squared residuals has an ARCH effect on the third delay. As a result, the data guarantees two input conditions for the estimate of two models, EGARCH and TGARCH.

**Table 4. Estimation result of EGARCH and TGARCH model**

EGARCH (1,1)		TGARCH (1,1)	
Variable	Coef.	Variable	Coef.
C	$8.9 \times 10^{-6}$	C	$7.8 \times 10^{-6}$
Variance Equation			
$\omega$	-0.8788***	$\omega$	$2.3 \times 10^{-6}$ ***
$\alpha$	0.2202***	$\alpha$	0.0305**
$\beta$	0.9317***	$\beta$	0.8069***
$\gamma$	-0.1091***	$\gamma$	0.1578***

Note: \*p < 0.1. \*\*p < 0.05. \*\*\*p < 0.01.

Based on the  $\gamma$  coefficient, the EGARCH and TGARCH models show that there is an information asymmetry in Vietnam’s stock market using VN-Index data from 2018 to 2022, with a significance of 1%.

**4.3. Result of measurement Adverse Selection Component**

The ASC findings for each ticker from 2018 to 2022 are derived by regressing the OLS for each ticker’s data to determine the coefficients  $c_0, c_1, z_0, z_1$ , then determining the average trading volume and applying the formula (4). The author must compute ASC for each stock separately in order to have a selective foundation when computing ASC for the full sample. Because the calculation results are significant only when  $0 < ASC < 1$  is used, stocks with  $ASC > 1$  or  $ASC < 0$  must be removed before calculating the overall ASC for the sample; otherwise, the overall ASC result can be very high or very tiny (Khang, 2007). Results in Appendix show that five equities, including FPT, PDR, PTB, TMS, and VSH, have an ASC greater than one. If these 5 stocks are excluded, the sample will be 73/78 businesses (more than 93% of the sample); still ensure to estimate the model and calculate the ASC.

For each stock, the process of determining ASC for each year or the entire period of 2018 – 2022 is similar. We additionally compute the corresponding average trade volume for that time period, employing a pooled regression model (Pooled OLS) to get the required coefficients. Brennan & Subrahmanyam (1995), Van Ness et al. (2001), Clarke & Shastri (2001) construct the ASC without taking into account the statistical significance of the regression coefficients, instead focusing on the event 0 ASC 1. As a result, the author did not take into account or examine the statistical significance of these coefficients.

**Table 5. Estimation result of ASC for each year and the period 2018 – 2022**

Year	$\bar{V}_t$	$c_0$	$c_1$	$z_0$	$z_1$	ASC
2018	1.462.565	304.6894	0.0000	2.080.2470	-0.0001	87.18%
2019	997.474	167.7902	0.0000	1.359.4320	-0.0001	89.92%
2020	2.177.432	300.3171	0.0000	1.680.8020	0.0000	86.52%
2021	4.093.325	207.8906	0.0000	2.449.8650	0.0000	93.05%
2022	3.548.838	296.4724	0.0000	3.216.2580	0.0000	88.11%
2018 – 2022	2.477.925	224.8042	0.0000	2.098.6050	0.0000	89.53%

In the case of categorized samples, the year with the highest ASC (93.05%) is 2021 while the year with the lowest ASC (86.52%) is 2020. ASC = 89.53% over the entire 5-year period from 2018 to 2022.

#### 4.4. Discussion

**Table 6. Result of estimation ASC in some papers**

PAPER	MARKET	PERIOD	ASC
Glosten & Harris (1988)	250 companies listed on NYSE	01.12.1981 – 31.12.1983	1.13%
Van Ness et al. (2001)	856 companies listed on NYSE	04.1999 – 06.1999	38.9%
Park (2008)	ETFs on NASDAQ	10.2005 – 12.2005	20%
Hoai & Khang (2008)	104 companies listed on HOSE	02.01.2007 – 28.12.2007	89.66%
Tu (2013)	112 companies listed on HOSE	03.01.2021 – 28.12.2012	72.75%
Ngai et al. (2016)	Companies listed on HOSE	01.12.2012 – 31.05.2013	77%
Phan (2021)	174 companies listed on HOSE	2009	89.2%
		2010	78.5%
		2011	79.1%
		2012	77.9%
		2013	79%
		2014	63.3%
This paper (2023)	78 highest capitalisation companies listed on HOSE	2015	72.2%
		2018	87.18%
		2019	89.92%
		2020	86.52%
		2021	93.05%
		2022	88.11%
		2018 – 2022	89.53%

Table 6 summarizes the research that used the Glosten & Harris model to determine the ASC. ASC was found to be less than 40% in all studies of the US stock market from 1981 to 2005. The ASC for Vietnamese stock market (HOSE) research is nearly always greater than 70%, indicating a large level of information asymmetry. This empirical conclusion accurately represents the challenge of information openness in a young stock market like Vietnam, where mistakes still occur often. The ASC value has increased significantly over the last five years when compared to earlier times, and it's near 90% or even more than 93% in 2021. The results of the author's ASC calculation accurately portray the market condition from 2018 to 2022, including the existing situation and a sequence of infractions. The ASC value of 89.53% for all five years indicates that the potential of reverse selection in a transaction on the Vietnamese stock exchange is quite high, indicating a significant degree of information asymmetry while the study's sample size is small. This is based on the stock code of the Ho Chi Minh Stock Exchange's top 100 companies. This figure highlights the need for Vietnamese investors, listed businesses, policymakers, and related organizations to take more active actions to remove asymmetric information and increase market transparency.

#### 5. CONCLUSION

The paper has been investigated using experimental data, with the results indicating the presence of information asymmetry and a level based on an ASC value of 89.53% over the period 2018 – 2022. To reduce the impact of information asymmetry, synchronized improvements and coordination from all market parties are required. Investors, issuers, securities firms, and state management agencies are key players.

**For investors:** Before the authorities can protect them, investors must first protect themselves. Second, in order to efficiently manage their investment portfolio, investors must constantly increase their expertise and learn from experience. Third, instead of relying on information conduits from other organizations, investors should actively collect and learn information. Finally, when participating in investments, investors must follow the State's standards on transparency and honesty.

**For listed companies:**

- (i) Recognize and fully adhere to information disclosure regulations.
- (ii) Making information available to the public in a timely and accurate manner.
- (iii) Fair competition with an honest accounting and internal audit system.
- (iv) Closely examine and oversee leaders to limit the problem of Principle – Agent.

**For stock companies:**

Firstly, stock companies must rigorously adhere to the terms of the law, which requires a thorough understanding of the principles of securities information.

Secondly, stock companies foster an open and honest company culture.

Thirdly, stock companies assemble a team of skilled and accountable employees.

Fourthly, stock companies broaden their customer information channels.

Fifthly, stock companies is continuing to upgrade current equipment.

**For the State Securities Commission:**

+ The State Securities Commission must conduct regular checks on the ability of enterprises and the audit department, as well as aggressively enforce violations and negative indicators.

+ The State Securities Commission should create a unified legal document on investor protection based on standardizing regulations on stock market management and development in accordance with International Organization of Securities Commissions (IOSCO) recommendations.

+ The State Securities Commission may explore increasing its role and broadening its authority to investigate and manage major violations of stock market matters.

**For Stock Exchanges:**

+ The procedure by which listed firms provide information should be altered. In fact, because the publicized information is concentrated on this agency, information leakage occurs frequently. As a result, corporations can post information on their mass media system, and the Stock Exchange merely needs to confirm that information.

+ Not only the State Securities Commission but also Stock Exchange can use market surveillance technologies. The supervisory process will be more effective when the Stock Exchange becomes the first supervisory body, lowering pressure on the State Securities Commission and enhancing the Stock Exchange's duty.

+ The Stock Exchange should better coordinate with the media spot anomalous material quickly, open up communication lines, and encourage investor feedback. Because there is a lot of information regarding stock market misbehavior that neither the Stock Exchange nor the State Securities Commission can identify, but due to this media power.

Despite tremendous attempts, the paper contains certain flaws due to restricted time and independent research capacity. First, due to data constraints, the topic can only measure the ASC value using each



Glosten & Harris model. Second, the issue not only tests and measures the level of asymmetric information via the ASC value, but also investigates what circumstances influence this change in value. Third, because it does not cover the entire market, the data size is constrained; when compared to the original studies of Glosten & Harris or Van Ness (2001), the number of observations is still tiny. To address the aforementioned inadequacies and restrictions, the author will assess ASC using multiple models the next time when the database of transaction statistics is changed and the information is released more thoroughly. Furthermore, the author will broaden the group of research stocks to include companies listed on the Hanoi Stock Exchange in order to better understand the factors influencing the level of adverse selection as well as asymmetric information of the Vietnamese stock market.

## 6. APPENDIX

### Appendix E. Results of ASC for each company

ID	ASC	MÃ	ASC	ID	ASC	ID	ASC
AAA	84.12%	DXG	86.82%	KOS	91.65%	SAM	96.19%
AGG	95.98%	DXS	85.32%	MSN	92.49%	SBT	87.92%
ANV	88.51%	FPT	101.53%	MWG	90.60%	SCR	86.35%
ASM	89.04%	FRT	85.63%	NKG	85.78%	SCS	87.53%
BCG	87.86%	GAS	78.80%	NLG	84.96%	SJS	89.11%
BCM	92.31%	GEG	93.34%	NT2	84.83%	SZC	94.69%
BMP	78.77%	GEX	87.00%	NVL	83.74%	TCH	86.69%
BWE	89.12%	GMD	92.46%	PAN	85.28%	TMS	105.19%
CII	83.40%	GVR	92.52%	PC1	89.01%	VCG	90.79%
CMG	97.52%	HBC	87.42%	PDR	104.76%	VGC	89.21%
CRE	93.21%	HDG	80.18%	PHR	91.89%	VHC	87.01%
CTD	83.75%	HNG	94.47%	PLX	91.10%	VHM	98.25%
CTR	86.93%	HPG	94.82%	PNJ	93.72%	VIC	96.02%
DBC	94.55%	HPX	92.39%	POW	89.11%	VJC	83.71%
DCM	83.15%	HSG	87.39%	PPC	89.59%	VNM	92.23%
DGC	94.75%	HT1	89.07%	PTB	106.05%	VPI	96.53%
DGW	94.09%	IMP	88.69%	PVD	88.57%	VRE	92.50%
DHC	85.29%	KBC	89.93%	PVT	87.51%	VSH	107.03%
DIG	79.87%	KDC	78.07%	REE	99.63%		
DPM	90.13%	KDH	89.76%	SAB	82.63%		

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## PREDICTING THE FINANCIAL HEALTH OF SMES IN VIETNAM: A COMPARISON AND EVALUATION OF RESULTS BETWEEN CLASSICAL MODELS AND MACHINE LEARNING MODELS

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**ABSTRACT:** Financial health is one of the most important factors to evaluate the effectiveness of the business. Forecasting the financial health of small and medium-sized enterprises (SMEs) helps to make market-appropriate business decisions and increases competitiveness in the international market. However, forecasting financial health for SMEs is faced with many major challenges. Some of them include the shortage of information, especially for start-ups or small businesses. The information on SMEs' financial activities is often not made public, leading to difficulties in data collection and analysis. In addition, existing classic models of financial health forecasting such as Z-score, X-score, and H-score, while commonly used, have some limitations and are not suitable in today's complex business environment. With the rapid development of technology, machine learning models are becoming an important tool in forecasting the financial health of SMEs. The study compared the effectiveness of machine learning models (Logistic, LDA, SVM, Random Forest, XGBoost) and classic models to forecast the financial health of SMEs in Vietnam. The results showed that the best in the machine learning model is XGBoost with a forecast of 94%, and the best classic one is X-Score with a forecast of 85.6%. This suggests that machine learning models can provide better predictive results than traditional classical models. The use of predictive models and machine learning tools such as XGBoost and the SHAP values algorithm is very useful in assessing the financial health of businesses. From the results of the SHAP algorithm, it can be seen that small and medium enterprises should focus on ROA indicators and quick payment ratios to be able to improve or prevent the risk of their business exhaustion.

**Keywords:** Financial health, SMEs, classic models, SHAP values.

### 1. INTRODUCTION

In the current market economy, most of the GDP is generated from enterprises. At the same time, enterprises play an important role in promoting the development of the economy, creating jobs for workers to bring a stable source of income. Therefore, the performance of enterprises is the main factor determining the development of GDP in particular and the whole socio-economic economy in general. However, many businesses nowadays face and directly be affected by the global recession of the economy, the post-Covid 19 epidemic, and the Ukraine-Russia war as well as the internal factors of the business itself. Some enterprises with good financial performance will survive and some are on the verge of bankruptcy. Thus, the “financial health” of businesses is an issue that we care about. The financial health of a business or company can be seen as its ability to maintain a balance against changing environmental conditions and in relation to all actors in the business. In assessing financial health and predicting the financial problems of businesses, different indexes are used that can serve as inputs for estimating figures or creating different models. The problem of “financial health” of most businesses is often related to depleted operating capital, high inventory rates, tightening bank lending, and unpaid debts... Evaluate based on financial indicators

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through financial statements published by businesses. In addition, use non-financial factors to consider the financial impact of enterprises to provide a model to forecast the ability to maintain operations, and the risk of bankruptcy or insolvency of small and medium-sized enterprises (SMEs') in the market... However, there are many studies in the world as well as a few studies in Vietnam interested in the financial health of enterprises, which are almost all done on enterprises with a large capitalization of over VND 100 billion. Currently, there is not much research focused on SMEs', while in Vietnam, SMEs' account for the majority of the market share and are a major contributor to the country's socio-economic development.

On the other hand, SMEs' are currently facing and suffering from many financial risks, difficulties in using capital appropriately, encountering some challenges in the process of "transforming" to meet market demand, especially being heavily affected by the country's economic situation such as epidemics, crises, inflation,...

Edward I. Altman's (I. Altman, 1968) work on the Z-Score model provided the first foundation for predicting the likelihood of bankruptcy in businesses with input data from 22 financial indicators of companies in the US stock market. The Z-score model has given 5 variables to forecast bankruptcy  $X_1$ : Working capital / Total assets;  $X_2$ : Retained profit / Total assets;  $X_3$ : Profit before tax and interest / Total assets;  $X_4$ : Market value of equity / Total Liabilities  $X_5$ : Total liabilities / Total assets. Altman proposed a predictive model with fixed weights based on statistical methods - Multiple Discriminant Analysis (MDA) and the result is a scale of about 3 levels: Safety, risk, and bankruptcy. His research was widely used in the following years, resulting in extremely accurate predictions.

The same method as Altman, in 1984, Fulmer (Fulmer, et al., 1984) introduced the H-Score model forecasting bankruptcy with 9 variables. Also with statistical methods - Multiple Discriminant Analysis. He used his model with businesses with a capital of about \$455,000 as a research platform for small and medium enterprises. Add to the model, Fulmer added fixed-asset elements and the ability to pay interest. The results of Fulmer's H-score model are classified as bankruptcy or safety.

However, in the 1980s, the financial markets changed. Financial data is no longer accurate with Altman's and Fulmer's models of Multiple Discriminant Analysis. The constraints of this approach on assumptions and Multiple Discriminant Analysis do not allow adding dummy variables. This hinders the determination of qualitative factors affecting the ability of the business to go bankrupt. Ohlson (Ohlson & J, 1980) invented his O-Score model in 1980 with a method of using logistic regression to predict the probability of a business's bankruptcy. He outlined nine research variables, which added two dummy variables of earning after tax less than zero over two years and a dummy variable of total debt greater than total assets. The results obtained from this method are more accurate and simpler than the statistical method - Altman and Fulmer's Multiple Discriminant Analysis.

From classical models in foreign studies, access to modern machine learning methods. The study of Huynh Thi Cam Ha (Ha, Uyen, & Mai, 2017) studied the application of the classification tree model in forecasting financial distress in enterprises in Vietnam listed on the Ho Chi Minh Stock Exchange and Hanoi Stock Exchange from 2009 to 2015. The research paper has 6 groups of variables: liquidity group, capital structure group and debt repayment capacity group, profitability index group, operation index group, growth index group, and non-financial index group. The study used two machine learning algorithms, C4.5 and AdaBoost to build a decision tree model. The model removed from 25 input variables the remaining 10 important variables, the results from the study ranked the importance of financial indicators and gave a threshold for the impact of those indicators leading to financial distress. For the C4.5 algorithm, the variable of financial leverage is the most important in affecting distress, whereas AdaBoost algorithm considers the variable representing the growth in equity as important. The results from the decision tree

model are surprisingly accurate with up to 99.5% predictability. However, the disadvantage of the model in the research paper is the need for a large amount of input data, the AdaBoost method needs the number of learning times to be repeated many times because the models learn from each other, leading to difficult model running, requiring large memory.

And most of the previous research papers have shortcomings: First, there is no comparison between methods. The second is aimed at large markets, companies with huge capitalization like the US. Third, there is no explanation of the importance of variables that affect the ability to exhaust. Therefore, this study offered a comparison of the performance of two classical methods and machine learning. Besides, assessing the importance of financial variables affecting the financial health of small and medium enterprises in Vietnam.

In summary, from overviews of studies predicting bankruptcy of domestic and foreign enterprises, most of the research focuses on large markets and businesses with huge capitalization such as the US. The great contribution of Altman, Fulmer, and Ohlson's research has solved the problems of enterprises in quantifying the risk of bankruptcy to help businesses understand the financial situation of their businesses. The models have measured financial indicators collected and aggregated from corporate financial statements over the years but have not yet expanded and agreed on qualitative variables as well as non-financial factors. main: type of enterprise, classification of business lines, number of shares held by shareholders... The influence of non-financial factors also leads to shortcomings in the ability to forecast the financial health of enterprises. This laid the foundation for the development of the research paper which has further practical applications in social life and financial markets.

Recognizing the importance of forecasting "Financial health" and offering solutions to limit the risk of bankruptcy for SMEs' in the post-COVID-19 period is urgent and necessary for the development of the country's economy, the research team decided to implement the project "Forecasting the financial health of small and medium enterprises in Vietnam: Comparing and explaining the results between classic models and machine learning models".

The project is implemented with the desire to contribute to diversifying domestic research as well as contributing to the assessment of the financial potential of SMEs', helping businesses have a better overview of their financial capacity and have an appropriate financial plan for sustainable development. The study will be evaluated by each group of enterprises based on relevant indicators and indicators to bring optimal results and consistency to the study.

The objective of the project is to develop a model for forecasting the financial health of SMEs' in Vietnam. Based on the study of SME theories, on the risk of financial distress and the development of financial health forecasting models.

The research topic uses qualitative and quantitative methods. Document research was conducted by systematizing existing research, finding research gaps, and building model ideas to overcome shortcomings in the connection between research variables and put research hypotheses for the topic. Quantitative research with estimating parameters, testing models, and hypotheses set out to make development recommendations. Refer to the expert method, based on the opinions and models proposed by the expert to increase the practicality of the topic. This article used descriptive statistics and quantitative models from classical to machine learning. The models used are Z - score, X - score, S - Score, H - Score, Logistics Regression, Linear Discriminant Analysis, Random Forest, Support Vector Machine, XGBoost... From there, it is suggested what is the best model to use to assess financial health, or in other words, the risk of financial distress. At the same time, it provides solutions to prevent and limit the risk of financial distress as soon as possible to ensure stable, long-term, and sustainable financial operations.

## 2. THEORETICAL FRAMEWORK

### 2.1. SMEs

Small and medium enterprises (SMEs) is a relative concept used to compare the size of an enterprise compared to large enterprises. The determination of criteria and norms for assessing the size of SMEs differs in each country, depending on the level of economic development, cultural context and the purpose of classifying SMEs. In VietNam, SMEs' definition in Chapter II Decree No. 39/2018/ND-CP date issued 11/03/2018, which has been introduced by the Government on support for small and medium-sized enterprises. Generally, based on the definition of SME Law, a very small-sized enterprise's number of laborers is not more than 10, the total capital is less than 3 billion or total revenue is less than 10 billion. MSMEs are manufacturer and service units that have not more than 200 employees, total capital less than 100 billion and total revenue less than 200 billion. However, most countries define SMEs according to three basic criteria: the average number of employees that enterprises use in the year, the total investment capital of the enterprise, and the total annual revenue of the enterprise. In which the criteria of labor and investment capital are more widely used.

**Table 1. Agriculture, Forestry, Fishery, Industry and Construction**

	<b>Number of laborers</b>	<b>Total capital</b>	<b>Total Revenue</b>
Medium sized enterprises	200	≤ 100	200
Small sized enterprises	100	20	50
Very small sized enterprises	10	3	3

*Source: Author's collection*

**Table 2. Trade and Service**

	<b>Number of laborers</b>	<b>Total capital</b>	<b>Total Revenue</b>
Medium sized enterprises	100	100	≤ 300
Small sized enterprises	50	50	100
Very small sized enterprises	10	3	10

*Source: Author's collection*

### 2.2. Financial distress

Corporate financial health or financial distress has been widely studied in many countries. In 1965, Foster defined financial distress as a “serious liquidity problem which is impossible to be resolved without the large-scale restructuring of the operation or structure of economic entities” (Foster. 1965). Md Zeni and Ameer (2010) defined financial distress as a term used to designate a situation when the obligations in a contract with debt cannot be fulfilled due to financial difficulties faced by the company. Ghazali, et al defined financial distress as temporary in which a company has difficulty paying debt or paying financial obligations (Ghazali et al. 2015). Financial distress is a temporary lack of liquidity, making it difficult to pay financial obligations. This situation increases when there are high fixed costs, illiquid assets, or revenue sensitive to bad fluctuations in the economy. Financial distress can lead to bankruptcy. There are many different views and signs of financial distress, but the general definition is when cash flow is not enough to ensure financial obligations, former shareholders lose ownership and creditors hold the assets of the business. This situation can be solved by restructuring business activities or economic organization structure. Financial distress is only the stage in the process of failure and restructuring of the business.

### ***Signs of financial distress of the business:***

A business runs into financial distress when there is insufficient cash flow to meet its financial obligations, and this can best be reflected by the cash flow of the business. Financially exhausted businesses often have liabilities greater than the total assets or interest payment ratio of less than one. In general, financial distress goes through three main stages: early, middle and later. At an early stage, the business will face many problems such as reduced operating profits, declining sales. The middle stage will make the business in a state of “insolvency”. Finally, in the later stage, when the problems cannot be overcome, the business is forced to end, this is the stage of “insolvency, bankruptcy”.

## **3. RESEARCH METHOD**

### **3.1. Data of research**

In this research, the data includes the financial information of SMEs in Vietnam, which was collected from the FiinPro database. This data comprises financial indicators such as assets, liabilities, revenue, profit, and other indicators. Data collection took place from 2018 to 2021, but some cases were excluded from the dataset to ensure the integrity and accuracy of the research results.

This study utilizes financial indicators to evaluate the financial health of SMEs on the UPCOM, HOSE, and HNX stock exchanges. Only businesses with a capital scale of 100 billion VND or less, established before 2018, and with at least 1-year financial activity were selected for analysis to obtain financial data. Financial distress prediction of SMEs was carried out 1 year prior to the distressing event.

### **3.2. Data preprocessing**

In the process of predicting the financial health of SMEs in Vietnam, processing the financial reports of small and medium-sized enterprises is a complex task that requires caution to ensure the accuracy and reliability of the forecasting results. Data preprocessing helps eliminate incorrect, missing, inaccurate, and irrelevant data before inputting them into the forecasting models.

After completing the data preprocessing process, the data will be cleaned and ready to be applied to the forecasting models and their effectiveness evaluated. The research team divided the dataset into training and testing sets as follows: using the year 2018 for training and testing in 2019, using the year 2019 for training and testing in 2020, and finally using the year 2020 for training and forecasting for 2021 to test.

### **3.3. Expected variables**

#### **3.3.1. Dependent variable**

The research study calculates the dependent variable based on two factors to determine when a company is labeled as distressed:

**Negative free cash flow:** Free cash flow is represented by the three cash flows in variables  $X_2$ ,  $X_3$  and  $X_4$ . When the free cash flow is negative, the company will not have any sources of funds to pay for its short-term debts, which is one of the signs of financial distress when the company cannot generate profits.

**S-Score index  $< 0.862$ :** The S-Score index is currently the most suitable index for evaluating the market in Vietnam, according to research by (Le Hoang Vinh and colleagues, 2022).

Therefore, determining the label for distressed companies is based on meeting at least one of the above conditions.

#### **3.3.2. Independent variables**

When researching the financial health forecasting model of Vietnamese SMEs, financial ratio variables are a crucial part. These variables measure and analyze the financial performance of the enterprise, helping



managers, investors, and other stakeholders to assess the financial health of the enterprise and make appropriate decisions.

In this study, the research team synthesized variables from classic models such as Z-Score, X-Score, H-Score, and added a number of commonly used variables to evaluate an enterprise.

**Table 3. Expected variables in the model**

Variable	Description of variables
$X_1$	(Short_term assets – Short_term debt) / total assets
$X_2$	Dummy operation cash flow (1 if $X_2 > 0$ , 0 if $X_2 \leq 0$ )
$X_3$	Dummy investment cash flow (1 if $X_3 > 0$ , 0 if $X_3 \leq 0$ )
$X_4$	Dummy financial cash flow (1 if $X_4 > 0$ , 0 if $X_4 \leq 0$ )
$X_5$	Earning before interest and tax / total assets
$X_6$	Net revenue / total assets
$X_7$	Earning after tax / total assets
$X_8$	Earning before tax / short-term debts
$X_9$	Earning before interest and tax / equity
$X_{10}$	Net cash flow / total debts
$X_{11}$	Logarithm(Tangible property)
$X_{12}$	Logarithm(Earning before interest and tax / interest expenses)
$X_{13}$	(Short_term assets - inventory) / short_term debts
$X_{14}$	Money / short_term debts
$X_{15}$	Cost of goods sold / inventory
$X_{16}$	Short-term receivables / net revenue
$X_{17}$	Cost of goods sold / payable accounts
$X_{18}$	Net revenue / fixed assets
$X_{19}$	Earning after tax / net revenue
$X_{20}$	Short_term debt / total assets
$X_{21}$	Total debts / total assets
$X_{22}$	Short_term assets / short_term debts
$X_{23}$	Earning after tax / equity

Source: Author's collection

### 3.4. Research models

#### 3.4.1. Random Forest

The Random Forest model is a machine learning algorithm used in classification and prediction problems. This model combines multiple decision trees to create a better classification or prediction model.

Random Forest uses Bootstrapping technique to randomly sample a subset of data from the initial training set to build a decision tree. Then, Random Forest combines these decision trees to create a more general classification or prediction model.

The decision trees are built by finding the most important features to divide the data into groups. The decision trees are built independently, thus, Random Forest minimizes the overfitting phenomenon.

The Random Forest also provides methods to evaluate the accuracy and importance of features. It is

also capable of handling missing and imbalanced data. Another evaluation method of Random Forest is the Out-of-Bag (OOB) error, which is calculated by using data points not used in the tree building process to evaluate the model. The Random Forest model is an effective classification and prediction model, widely used in real-world problems.

### 3.4.2. *eXtreme Gradient Boosting (XGBoost)*

The XGBoost model is a powerful and widely used machine learning algorithm for classification and prediction problems, including financial distress prediction. It is built on the idea of using decision trees to create a high-performance classification or prediction model.

The decision trees in XGBoost are created through a boosting process, in which a sequence of decision trees is generated. Each decision tree learns from the errors of the previous decision tree and is modified to produce a new decision tree with better performance. Each decision tree is trained to predict the value of the dependent variable based on the values of the independent variables.

XGBoost combines a loss function and a regularization function to create an objective function for model optimization. The mathematical formula for the objective function  $F$  in XGBoost is expressed as follows:

$$\text{Objective}(F) = L(y, F) + \Omega(F)$$

where:

Objective(F): the objective function

$L(y, F)$ : the loss function

$\Omega(F)$ : the regularization function

The XGBoost model is a variant of Gradient Boosting, in which some improvements have been made to enhance the speed and performance of the algorithm. An important improvement of XGBoost is the use of a differentiable loss function to optimize the model. Specifically, the loss function used is the log loss, similar to that in logistic regression.

XGBoost also uses decision trees to build the model, but instead of using independent decision trees, XGBoost uses a series of level-wise decision trees, each decision tree is built to optimize the remaining error after the previous decision trees have been built.

### 3.4.3. *Explain machine learning model by using SHapley Additive exPlanations (SHAP)*

Machine learning models are tools used to predict outcomes based on previously trained data. They can be seen as the artificial brain of a system, capable of learning from input data and optimizing parameters to make the most accurate predictions. However, some types of machine learning models, such as black box models, can make it difficult to explain their workings and decision-making processes, leading to difficulties in explaining why a decision was made or how the model arrived at its prediction. To address this issue, Lundberg and Lee introduced the SHAP (SHapley Additive exPlanations) explanation method in 2017. This method is based on Shapley values theory, a concept introduced in 1953 by Shapley and used to allocate value to a group of players based on their contributions to winning a game. SHAP values calculate the contribution of each feature to the model's prediction, helping users understand which features the model is predicting based on and why. The formula for calculating Shapley values for a feature is obtained by taking the average difference between the predicted value of the model with and without that feature.

$$\phi_i(f, x) = \sum_{z' \subseteq x'} \frac{|z'|!(M - |z'| - 1)!}{M!} [f_x(z') - f_x(z' \setminus i)]$$

Where:

$\phi_i(f, x)$  is the SHAP value of the input variable  $i$ th

$x$  is the input vector

$z'$  is the subset of  $X$  without variables  $i$ th

$f_x(z')$  is the prediction of the model on the  $z'$

$f_x(z' \wedge i)$  Is the prediction of the model on the  $z'$  added variable  $i$ th

$M$  is the number of input variables

The formula calculates the Shapley value of a feature by comparing the model's predicted value when that feature is present and when it is absent. Shapley values are computed for all features and summed to obtain the overall Shapley value for that data point.

#### 3.4.4. Model evaluation

The confusion matrix is a tool for evaluating the performance of a classification model. It helps assess the model's predictive ability by comparing the predicted results to the ground truth. The confusion matrix consists of four main parts: True Positive (TP), False Positive (FP), True Negative (TN), and False Negative (FN). Performance evaluation metrics such as Accuracy, Precision, Recall, and F1-score are computed based on the confusion matrix. The Type 1 and Type 2 error rates are important metrics for evaluating the model's classification ability on both Positive and Negative classes. If the error rate is too high, the classification model needs improvement to reduce classification errors.

Accuracy is the ratio of the number of correctly classified cases to the total number of cases and is calculated by the formula:  $\text{Accuracy} = (\text{TP} + \text{TN}) / (\text{TP} + \text{TN} + \text{FP} + \text{FN})$ . Accuracy reflects the model's ability to classify correctly across the entire data set.

Recall is the ratio of the number of correctly classified Positive cases to the total number of actual Positive cases and is calculated by the formula:  $\text{Recall} = \text{TP} / (\text{TP} + \text{FN})$ . Recall reflects the model's ability to classify correctly on the Positive class.

AUC (Area Under the ROC Curve) is the area under the Receiver Operating Characteristic (ROC) curve and measures the model's ability to distinguish between Positive and Negative classes. The closer the AUC is to 1, the better the classification model.

F1-score is the harmonic mean of Precision and Recall and is calculated by the formula:  $\text{F1-score} = 2 * \text{Precision} * \text{Recall} / (\text{Precision} + \text{Recall})$ . F1-score reflects the balance between Precision and Recall.

## 4. RESEARCH RESULTS

### 4.1. Data preprocessing and results

**Table 4. Descriptive statistic of variables**

	Mean	Median	Standard Deviation	Kurtosis	Skewness	Minimum	Maximum
$X_1$	0,222	0,187	0,236	0,282	0,406	-0,947	0,957
$X_2$	0,710	1	0,454	-1,138	-0,929	0	1
$X_3$	0,304	0	0,460	-1,272	0,854	0	1
$X_4$	0,328	0	0,469	-1,460	0,735	0	1
$X_5$	0,085	0,071	0,087	7,303	1,336	-0,369	0,831
$X_6$	1,270	0,966	1,279	14,438	3,126	-0,045	12,626
$X_7$	0,058	0,044	0,077	8,840	1,256	-0,383	0,829
$X_8$	0,417	0,146	1,313	220,653	11,871	-7,973	27,924

X <sub>9</sub>	0,164	0,161	0,796	2249,530	-46,041	-38,669	3,687
X <sub>10</sub>	-0,006	0,001	0,963	215,491	-5,796	-24,133	12,082
X <sub>11</sub>	4,940	4,930	0,962	0,298	-0,187	0,785	7,837
X <sub>12</sub>	0,900	0,703	0,789	3,422	1,467	-1,686	6,403
X <sub>13</sub>	2,100	1,039	4,068	83,701	7,549	0,034	72,927
X <sub>14</sub>	0,478	0,164	1,164	56,696	6,670	0	15,850
X <sub>15</sub>	5490,677	5,513	137418,6	967,195	29,753	0	5130950
X <sub>16</sub>	0,565	0,215	5,685	599,946	-5,986	-163,892	153,078
X <sub>17</sub>	63,757	8,985	1037,200	1491,568	36,558	0,000	45058,8
X <sub>18</sub>	60,483	5,578	630,771	730,614	25,255	-2,960	20157,09
X <sub>19</sub>	-0,060	0,039	3,330	1025,491	-30,063	-123,421	28,263
X <sub>20</sub>	0,392	0,374	0,222	-0,728	0,333	0,004	1,168
X <sub>21</sub>	0,474	0,482	0,228	-0,836	-0,062	0,004	1,244
X <sub>22</sub>	2,464	1,460	3,179	32,423	4,834	0,109	40,736
X <sub>23</sub>	0,092	0,094	0,801	2318,338	-47,083	-39,284	4,194

Source: Author's calculation

The research team conducted Exploratory Data Analysis on a dataset of 507 companies. The team created a target variable using the S-Score model and free cash flow as the criteria. If a company had either an S-Score < 0.862 or negative free cash flow, it would be unable to pay its short-term debts and would be labeled as 1; otherwise, if the S-Score ≥ 0.862 and free cash flow is positive, it would be labeled as 0. As a result of this labeling, the study identified 97 bankrupt companies and 410 non-bankrupt companies.

After labeling the dependent variable, the research team constructed independent variables from financial statement to fit the list of expected variables entered into the model, including 23 financial indicators. Variables used to calculate the S-Score and those with high correlation were removed to avoid duplication.

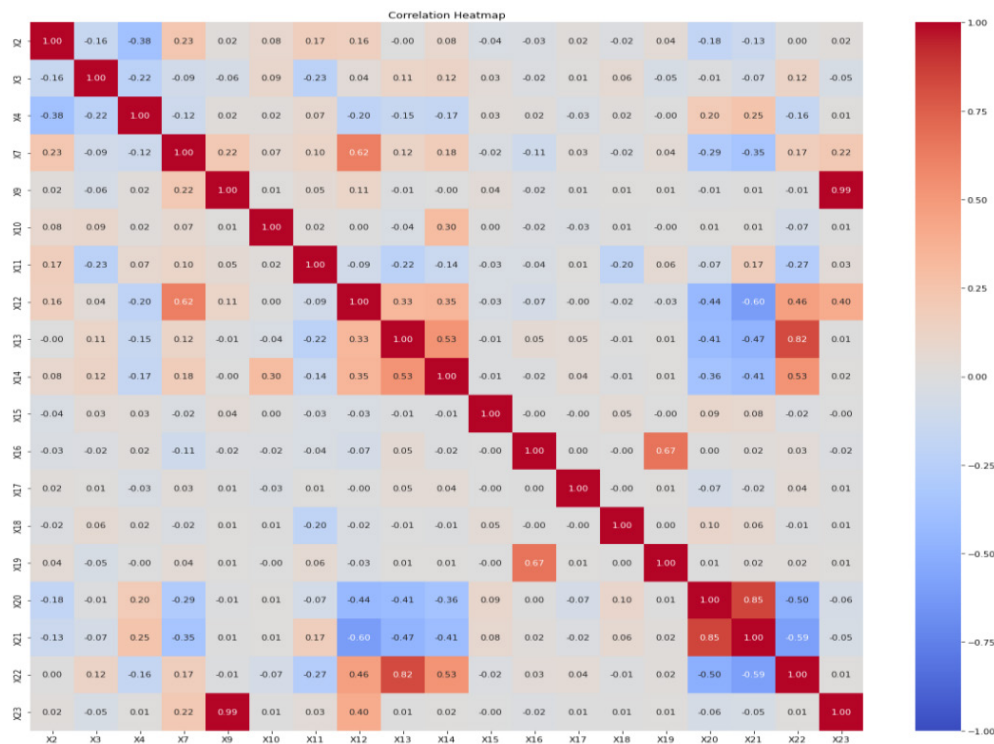


Figure 1. Correlation matrix between variables

Source: Author's calculation

Based on the correlation graph, the research team removed variables with high correlation, such as  $X_{21}$ ,  $X_{22}$ , and  $X_{23}$ . In addition, variables used as conditions for the dependent variable calculation, such as  $X_1$ ,  $X_5$ ,  $X_8$ , and  $X_6$ , were also removed to avoid duplication.

Six best variables were selected to be included in the machine learning models for comparison with the classical models that uses fewer variables, to examine the superiority of the machine learning methods over the classical ones. After data calculation, the model selected variables  $X_7$ ,  $X_{13}$ ,  $X_{16}$ ,  $X_{17}$ ,  $X_{18}$ , and  $X_{19}$  for machine learning computation.

The research team performed data splitting into training and testing sets, and tested the predictions based on training and testing over the years. Year 2018 was used for training and predicting for year 2019, year 2019 was used for training and predicting for year 2020, and year 2020 was used for training and predicting for year 2021.

**4.2. Comparison and evaluation of the results between the classical models and the machine learning models**

**Table 4. Comparison of predictive power and error types between the machine learning models and the classical models**

	Accuracy	Type 1 Error	Type II Error
XGBoost	94%*	3,41%***	10,25%***
Random Forest	76%	7,95%	7,69%**
X – Score	85,6%**	12,97%	1,42%*
Z – Score	85,1%***	0,23%*	18,35%
H – Score	81,9%	1,09%**	17%

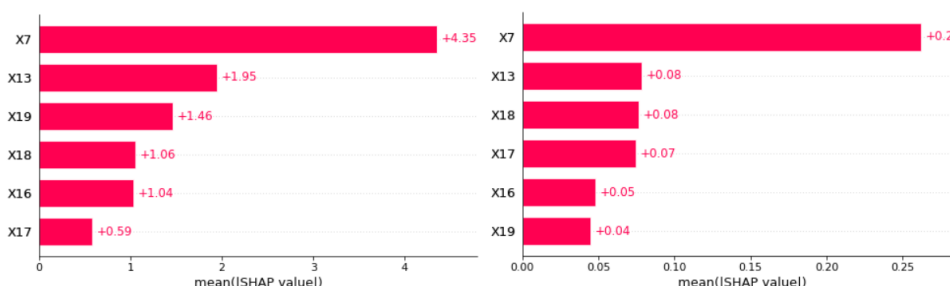
With \* being the first rank, \*\* being the second rank, and \*\*\* being the third rank

Source: Author’s calculation

In the model evaluation table, XGBoost and X-Score performed the best with accuracies of 94% and 85.6%, respectively. Although XGBoost had a higher accuracy, X-Score misclassified the fewest distressed samples. Random Forest and Z-Score had lower performances, with Random Forest achieving only 76% accuracy and Z-Score achieving 85.1%. However, both error types and accuracy need to be considered when evaluating a model. Therefore, XGBoost and X-Score are noteworthy models, while Random Forest and H-Score need improvement to achieve better performance.

The results show that the XGBoost model is suitable for predicting the financial health of small and medium-sized enterprises. This model provides a more modern approach and prediction in the digitalization process of enterprises. On the other hand, the X-Score model still demonstrates outstanding ability in predicting for businesses despite some limitations. This helps businesses prevent risks and make appropriate adjustments to avoid bankruptcy.

**4.3. Explanation of machine learning model results**

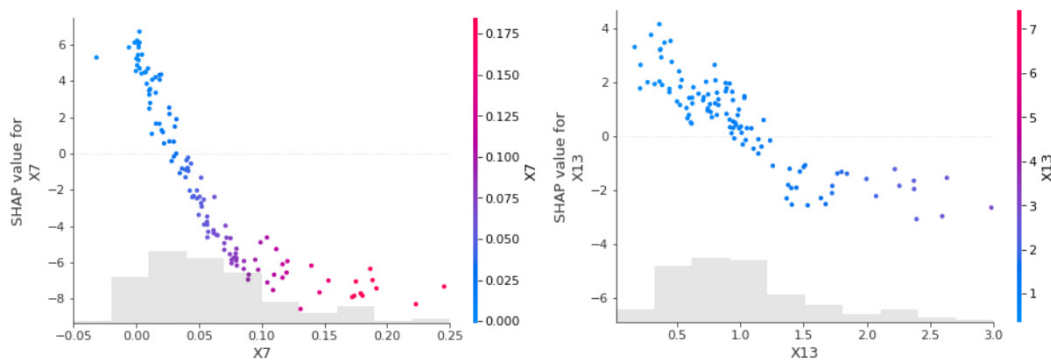


**Figure 2: SHAP evaluation plots of the XGBoost (left) and Random Forest (right)**

Source: Author’s calculation

Based on the calculated SHAP values, it can be seen that both machine learning models evaluate variable  $X_7$  as the most important variable and having a strong impact on the likelihood of a small and medium-sized enterprise falling into financial distress. Additionally, variable  $X_{13}$  also has an impact at a moderate level for the XGBoost model, which evaluates it as high after variable  $X_7$ , while for the Random Forest model, it is evaluated as having the same impact as variable  $X_{18}$ . Therefore, it can be seen that for variable  $X_7$ , which represents ROA, the profitability level based on the assets of an enterprise has a significant impact on whether that enterprise may fall into financial distress or not. Further consideration of  $X_{13}$ , which represents the quick ratio of an enterprise, may also affect the ability to predict financial distress.

To have a clearer evaluation of the impact level of these 2 variables on the predictive ability, the research team visualized the dependency graphs of each variable.



**Figure 3: Dependency plot of variable  $X_7$  (left) and variable  $X_{13}$  (right)**

Source: Author's calculation

It can be seen that these are two opposite variables. For variable  $X_7$ , which represents ROA, the SHAP value analysis of the XGBoost model's predicted value shows that the higher the after-tax profit ratio on total assets, the lower the likelihood of financial distress. A significant decrease in after-tax profit may lead to a decrease in the company's ability to repay debts, as well as a lack of capital for business development. Maintaining a reasonable and stable level of profit will help the company achieve sustainable development and avoid the risk of financial distress.

The analysis of the XGBoost model's SHAP value prediction shows that the higher the quick ratio, the lower the likelihood of financial distress. If a company's quick ratio is too low, the company may not have enough current assets to pay off its short-term debts. This means that the company may have to rely on borrowing or selling long-term assets to meet its short-term obligations. Based on the results from SHAP values, companies should maintain this ratio above 1 to have a stable financial health and minimize the risk of financial distress.

## 5. DISCUSSION

The use of the XGBoost machine learning model to forecast financial health for small and medium-sized businesses is a clear advantage. Compared to classic models such as Z-score, X-score and H-score, XGBoost has better predictability with higher accuracy and better categorization. By using machine learning algorithms and data mining techniques, XGBoost can learn from the historical data of the business and make forecasts about the future financial situation of the business in a more accurate and effective way. One of the important advancements compared to previous studies is the ability to provide comprehensive and consistent explanations of the significant variables that impact the financial health of a business using the SHAP values method. By utilizing this approach, we can easily explain and update the strong influencing factors on the model with changes in the micro and macroeconomic environment.

One of the important progress compared to past research articles is the explanation of important variables that have a full and consistent financial health of the enterprises by the SHAP Values method. Using this method will help us easily explain and update the factors that strongly accelerate the model with changes in the micro and macroeconomic environment to be able to offer response measures in time.

However, to achieve the best results when using XGBoost, it is necessary to have a complete and accurate database to be able to train the model. At the same time, it is necessary to invest in and develop new techniques and technologies to enhance the performance of the model.

In general, the use of the XGBoost machine learning model is an effective solution to improve forecasting and financial management for small and medium enterprises in Vietnam. However, it takes investment and research to be able to apply the model effectively and meet the requirements of the market.

In addition, based on the SHAP algorithm, it can also be seen that the importance of interpreting the machine learning model to be able to understand more about the problem. Because without explaining the internal problems, small and medium enterprises cannot know the directions to overcome their situation when they know the forecast results are exhausted. That's why it's important to explain the machine learning model has given important financial indicators that small and medium enterprises need to pay attention and pay special attention to improve their situation. In addition, other indicators also contribute a lot to the forecast of financial health of businesses, so businesses should not ignore these indicators. In summary, the study has made comparative results between the classical model and the machine learning model. As a result, businesses can see the importance of digital transformation, applying machine learning models and checking their financial health in addition to using classic models that have many shortcomings.

## **6. CONCLUSION**

### **6.1. Using Machine Learning Models to Forecast the Financial Health of Enterprises**

For small and medium-sized enterprises (SMEs) in Vietnam, using machine learning models to forecast the financial health of businesses can bring numerous benefits, not only in making accurate and effective business development decisions.

One of the benefits of using machine learning models is their ability to help businesses forecast economic and market trends in the future. This enables businesses to prepare appropriate plans and strategies to respond to changes in the business environment.

Furthermore, using machine learning models also helps businesses identify potential risks and take preventive measures before they become severe. This enhances the sustainability and stability of the business.

Lastly, using machine learning models can enable businesses to seize new opportunities and develop their operations more effectively. With accurate forecasting capabilities, businesses can make timely and informed decisions to capitalize on market opportunities.

Therefore, employing machine learning models to forecast the financial health of enterprises is an effective solution to improve strategic decision-making and enhance the sustainability of businesses.

### **6.2. Enhancing Investment in Research and Development of Machine Learning Models**

To improve forecasting capabilities and make appropriate strategic decisions in the market, small and medium-sized enterprises in Vietnam need to increase investment in research and development of machine learning models for financial health forecasting.

One way to enhance forecasting capabilities is to analyze historical data of enterprises and utilize machine learning models to identify trends and relationships among different financial variables. The results can be used to make strategic decisions such as investment, product development, and business expansion.

Moreover, increasing investment in research and development of machine learning models can help businesses discover new approaches to enhance forecasting capabilities. Therefore, strengthening investment in research and development of machine learning models brings multiple benefits to small and medium-sized enterprises in Vietnam, enabling them to improve forecasting abilities and make market-appropriate strategic decisions.

### 6.3. Introducing Support Policies and Encouraging Businesses to Adopt Machine Learning Models

To support small and medium-sized enterprises in Vietnam, it is necessary to introduce policies that encourage the use of machine learning models for financial health forecasting. However, applying these models still poses challenges, such as insufficient technical knowledge, lack of resources, and the accuracy of forecasts. Enhancing training, providing financial support, and building better machine learning systems for accurate and cost-effective financial health forecasting can enhance business efficiency in a fiercely competitive market.

### 6.4. Limitations and Difficulties of the Research Topic

During the research and analysis process, the thesis encountered certain limitations and difficulties. One of these challenges was the scarcity of financial health data for small and medium-sized enterprises in Vietnam. This limitation affected the accuracy of the analysis and evaluation results, as well as the construction of financial health forecasting models for businesses.

Additionally, the differences in scale and experience among researchers were also limitations of the research topic. Furthermore, the diversity of external factors affecting the financial health of enterprises complicated the process of drawing conclusions. However, with relentless effort and dedication from researchers, this thesis still provides noteworthy and valuable results for the business community in Vietnam.

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## LEGAL ISSUES ARISING WHEN APPLYING BLOCKCHAIN TECHNOLOGY IN THE FIELD OF REAL ESTATE BUSINESS: EXPERIENCES OF SOME COUNTRIES AND RECOMMENDATIONS FOR VIETNAM

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**Instructors: Tran Thi Thu Phuong**

**ABSTRACT:** *Blockchain was originally created to enable peer-to-peer digital payment systems (bitcoin). Along with the continuous development of Blockchain technology, applications are becoming more and more popular, including transfer transactions and asset trading. A significant contribution of this technology is the smart contract feature. A traditional real estate transaction across Europe in general and in Vietnam in particular often involves many intermediaries, so these transactions are time-consuming or difficult to operate across borders. When blockchain is combined with smart contracts, there can be an important role to play in these transactions. However, the application of Blockchain technology is still quite new, especially in the field of real estate business and there is no legal regulation such as the rights of the parties may be limited, the ability to modify, and the legal risks that the parties to the transaction may face. Therefore, in addition to illustrating the benefits that Blockchain technology brings to the real estate business, the article also analyzes legal issues arising in countries around the world when applying Blockchain technology, and how Blockchain enhances security for transactions in real estate business. The article also provided a nationwide survey in Vietnam to find out the factors affecting the decision to apply Blockchain technology to keep abreast of the actual situation in Vietnam. From there, provide solutions and recommendations to improve the legal basis for smart contract contributing to strengthening and developing the country's economy.*

**Keywords:** *Real Estate, Blockchain, Smart Contract, Law.*

### 1. INTRODUCTION

Based on the outstanding characteristics, safety and high security, Blockchain works in the following way: Blockchain is a distributed, shared and trusted consensus ledger; therefore it forms a highly reliable digital ledger, which records transactions, especially this ledger is maintained within and between the participants of the network. With blockchain, a single record is shared to each party involved in the transaction. Every transaction that has occurred or is pending will be grouped and stored in a fixed structure called a block. Through the consensus protocol, when each block is validated as true and reliable, the block is linked to the chain and sent to copies of the ledger that is distributed and stored by each member of the network.

When each block is loaded into the ledger, it is linked to the previous block using their respective hashes. This forms a completely traceable and impossible to tamper with record in the blockchain.

Although originally created to limit or eliminate traditional intermediaries in the issuance of currency. Sharing at the seminar “Opportunities and challenges of applying Blockchain in banking and finance activities” organized by the Vietnam Banking Association (VNBA), Dr. Nguyen Quoc Hung - General Secretary of VNBA said that, with its decentralized nature, Blockchain (blockchain) has solved many dilemmas. Many countries around the world, including Vietnam, have recognized the potential of Blockchain technology and sought to apply it in the fields of finance, banking, transportation, logistics, health care, education...especially in the field of real estate business.

Interest in this technology has been reflected in a series of projects to test its feasibility. In Estonia, for example, the government is using blockchain to secure health records, and the UK looked into a blockchain

to pay for and control research grants in 2016. The Catalan government recently announced the “Catalan Blockchain Strategy”, which aims to implement a blockchain ecosystem for regional authorities, including an ID system, sharing of medical data to enhance organ donation, and a self-consumption energy sharing system through blockchain.

Blockchain in the real estate business is the application of blockchain technology at different stages of the real estate transportation and purchase process. Blockchain real estate will use a network of computers and nodes to act as a more advanced and secure escrow company through digitalized forms of smart contracts. However, instead of just trading through documents in exchange for cash like escrow companies, the application of blockchain technology to the real estate business will bring many benefits such as real estate transactions with cryptocurrencies through encrypted legal contracts, etc. In terms of land registries, land registries from Sweden, New South Wales (Australia), GA, and the United Kingdom have explored the use of blockchain to register ownership. In addition, several U.S. private companies are studying the possibility of completing the entire process required to sell assets through a distributed ledger, such as Household, Averspace, Urbit Data, Zillios, or Velow.re. The leasing sector is also deploying the technology through a partnership between the city of Rotterdam (Netherlands) and Deloitte Global (Veuger, 2018) through Rentberry (an app that uses blockchain to lease assets) to help the “Cambridge innovation hub” (UK).

The results of these applied and experimental studies all agree on the potential impact of blockchain technology on the real estate business and the need to stop and change traditional processes, in order to eliminate costly intermediaries. The impact on the sector can be representative because of its importance in the economy: according to the European Commission (2015), “the contribution of the real estate sector to the production of national economies fluctuated in 2012 from 5.7% of total value-added produced in Lithuania to 15.8% in Greece” and the real estate business sector grew more than the entire economy”. However, does this potential disruption, the application of blockchain technology in the real estate business instead of traditional transactions, ensures the rights of buyers/tenants when buying real estate? The disadvantage of buying and selling real estate through the current blockchain system is that there will be no notarized contracts, registration of ownership, or right to use the property separately for each person. Therefore, this sale and transfer is not currently based on the provisions of the current law. It can be seen that, along with the application of high technology, the key of the blockchain model (a subdivision of real estate) is completely legal. Therefore, this paper aims to explore, from a legal perspective, the challenges, limitations and potential opportunities of blockchain applications in the field of real estate business, learning from the experience of countries - how they have solved when they face those challenges, in order to contribute to perfecting Vietnam’s legal system in applying Blockchain to real estate business.

#### Main contributions:

- This article proposes specific solutions and recommendations to improve Vietnam’s legal system when applying Blockchain technology in the field of real estate business.
- In practical terms, the article presents the experience of applying Blockchain technology in the field of real estate business in countries around the world. The results of the analysis help the research team draw experiences to contribute to improving the Vietnamese legal system effectively.
- From the analysis, the paper proposes directions to improve the legal system, seven specific recommendations include: ensuring the security of IDs; clearly defining the nature of real estate business transactions conducted on the blockchain technology platform; perfecting the legal corridor on smart contracts;... There are also solutions on the side of state management agencies and on the side of enterprises, organizations and individuals.

## 2. THEORETICAL FRAMEWORK

The theoretical framework of this study is based on the theory of Blockchain technology. Blockchain technology by transparently sharing information within a business network. The database stores data in blocks that are linked together to form a blockchain. Then there are blockchain-powered smart contracts, smart contracts are one of the innovations that support blockchain technology that is highly progressive and important (Arup 2017). In 1994, Nick Szabo defined a smart contract as a computerized transaction protocol that implements the terms of a contract. Blockchain technology supports businesses to apply it to transform technological processes, and perform transactions in real estate purchases. Through smart contracts, blockchain technology refers to an automated transaction protocol that aims to meet the terms of the contract agreement, reduce subjective and objective errors, and reduce the number of middlemen in the execution of contracts. In other words, a smart contract is digital computer code (or a programmable contract) that eliminates trusted third parties and self-executes its terms when preset conditions are met; the code is linked to digital currencies (e.g. ether, bitcoin) as a representation or payment of the asset (s) (Arup 2017; Yang et al. 2020). Szabo (1994) discussed some of the economic benefits of automated contracts including reduced contract arbitration (through automation), low fraud losses, and reduced costs of contract enforcement and transactions. However, smart contracts are not suitable for the existing traditional legal framework of many countries applying them. Therefore, their intended use in general transactions and in real estate business transactions to ensure legal obligations raises some difficult legal questions. Wendy Callaghan and Rajika Bhasin (2018) focus on the difficulties of smart contracts in: The encryption of contracts; issues of authority, the identity of the parties involved,... Moreover, Mitch Jackson (2023) has also brought up the 10 biggest legal issues of smart contracts.

From the above basis, the research team decided to analyze and collect information from previous studies in order to better understand the legal issues surrounding the application of Blockchain technology in the field of real estate business of countries ahead in the world, learn the factors affecting the decision to apply Blockchain technology in Vietnam, and give direction for improving the legal system of the country.

### 2.1. General concepts

There are several other definitions of Blockchain as follows:

Blockchain is essentially a distributed database of records or public ledgers of all digital transactions or events that have been made and shared among participants. Each transaction in the public ledger is verified by the consensus of a majority of participants in the system. In addition, once entered information can never be deleted (Crosby et al., 2015).

Blockchain technology uses public key encryption and hash functions to ensure data transparency, integrity, and privacy; using each node in the network as a client and also a server to store application copies, and applying the principles to the nodes participating in the system are subject to the rules of consensus play (Savjee, 2017), (IBM Think Academy, 2016).

Blockchain can be defined as follows: “Blockchain is a digital ledger of cryptographically signed transactions. Each block that is cryptographically linked to the block before it after being saved goes through a consensus decision to validate the data. When a new block is added, the older block becomes difficult to edit. The ledger is then copied to the entire network and any conflicts are resolved automatically through established rules.”

Blockchain in the field of real estate business is: the application of blockchain technology to the real estate business. To put it simply, Blockchain real estate will use a network of computers and nodes to act

as a more advanced and secure escrow company through digitalized forms of smart contracts. Distributed ledgers are algorithms that are considered powerful, disruptive innovations that can transform the delivery of public and private services. (Mark Walport, 2016).

Real estate tokenization is the process that involves converting physical assets, such as real estate, into digital equivalents, called tokens, using blockchain technology. These tokens represent ownership of assets and can be traded on a Blockchain or ledger platform. In addition to replacing private data such as credit card information, the goal of the token is to protect valuable information against theft or cyberattacks. (Verma Shreshtha, 2023).

## **2.2. The role of the application of Blockchain technology in the field of real estate business.**

The application of blockchain to the real estate business is important and necessary. The involvement of blockchain limits and eliminates human involvement in the storage process, verifying liquidity and thereby improving the accuracy and credibility of transactions. In addition, the maximum cost savings and increased transparency help transactions take place safely, efficiently and create trust for real estate investors. From there, it creates a more transparent, clear and developed real estate business environment when blockchain is applied.

### *Advantages of applying blockchain technology in the field of real estate business:*

+ With the results of the research project “Influence of Blockchain in the Real Estate Sector“ by Jan Veuger (2019), one of the main benefits of Blockchain is secure database sharing. Profiles of leasing, buying and selling transactions became common knowledge. Many listing services, collating asset-level information from brokers’ and agents’ own databases is a prime example of why this new technology is so important.

Many independent parties can also use a blockchain-enabled database, but only legitimate parties have access to that database. Therefore, only contractors involved in the management of real estate, such as owners, tenants, lenders, investors, operators and other service providers, always have stable and quick access as well as the ability to modify or add the necessary information.

+ In the research topic of Anniina Saari, Jussi Vimpari, Seppo Junnila (2022) on “Blockchain in real estate: Recent developments and empirical applications.” has given the research results that with blockchain, all subjects acquire a digital identity that cannot be confused or appropriated. It leads to more transparent record keeping with property ownership, mortgage rights, or financing. Now, this technology allows companies to operate without intermediation through the blockchain.

+ A transaction can be made more efficiently through the blockchain. Specifically, the combination of smart contracts and blockchain makes transactions more transparent, clear and efficient. (Amazon’s “What is Blockchain Technology?”).

For example, a sale may depend on a claim or loan approval. With blockchain, real estate entities can check whether such transactions have been made and whether conditions have been met.

+ When Dntech implemented “Learn about Blockchain”, based on the cryptography principle of Blockchain, it almost overcame another problem with real estate that it needs to be more secure and protected from malware through data encryption. For example, it allows encryption of all data transactions in the database to prevent any data breaches, like the cryptocurrency exchange project Extobit.

The application of Blockchain technology helps solve many of the problems that traditional real estate business faces.

The advantages of applying Blockchain technology to real estate business as presented above come from the characteristics of applying Blockchain technology in real estate business. Specifically as follows: Tokenization of real estate; smart contracts; security and transaction control; asset management automation; transparent data tracking and analysis; common ownership and Investment; access to secondary market opportunities; global asset distribution.

### 3. RESEARCH METHODOLOGY

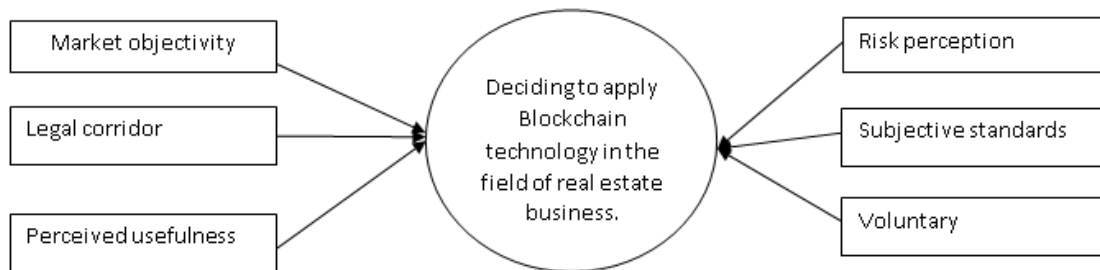
#### 3.1. Proposal of research models and hypotheses

The study of the authors uses the TAM2 technology acceptance theory of Venkatesh and Davis (2000) as the basis of research theory to explain the decision behavior of applying Blockchain technology in the field of real estate business.

On the basis of research, the research team has proposed a model to study factors affecting the application of Blockchain technology in the field of real estate business in Vietnam.

The research model is established based on an overview of domestic and foreign studies on factors affecting the application of Blockchain technology in the real estate business.

In this study, in addition to three factors: feeling usefulness; subjective standards; voluntariness of the TAM2 theoretical model of Venkatesh and Davis (2000), 3 additional factors are market objectivity, legal corridors and risk perception to study their influence on the application of Blockchain technology in the field of real estate business.



**Fig 1. Initial research model**

The research model includes 6 hypotheses affecting the decision to apply Blockchain technology in the field of real estate business: market objectivity (TKQ), legal corridor (HLPL), perceived usefulness (CNTHI), subjective standards (TCCQ), voluntary (TN), perceived risk (CNRR).

#### 3.2. Research method

##### 3.2.1. Qualitative research methods

This study is based on the qualitative research method as the main method. The authors have read, collected, analyzed and studied the available data in documents, articles, studies, etc. related to blockchain technology, the application of blockchain technology in the fields and especially in the field of real estate business. The sources of documents include domestic and foreign documents. The use of this method helps the team capture information related to the topic, thereby uncovering legal challenges, as well as opportunities when bringing blockchain into the real estate business.

In addition, the search and analysis of foreign documents related to blockchain technology and the application of blockchain in the fields of life, especially in the field of real estate business, thereby giving references to Vietnam.

**3.2.2. Quantitative research methods**

The authors combined research using quantitative research methods with the purpose of serving the main research method as a qualitative method, in order to measure and test the relationship between variables in the form of measurements and statistics, and survey the actual situation.

The survey is conducted through Google Forms, then sent to those who are knowledgeable about real estate business and Blockchain technology such as through real estate business groups, conferences on challenges and benefits that Blockchain technology brings,... to target groups who have understanding of Blockchain technology in the field of real estate business throughout the territory of Vietnam.

In the survey, the authors give 5 levels in each observation variable from strongly disagree, disagree, neutral, agree to strongly agree for survey participants to choose and assign values from 1 to 5 to conduct numerical data analysis on SPSS software.

Based on the results of the collected data, the team conducts descriptive statistics, scale tests, and EFA analysis to statistically and analyse the factors influencing the decision to adopt Blockchain technology in the real estate business sector.

Results:

**Table 1. Results of EFA and Cronbach alpha scales.**

Variables	Average	Total variable correlation coefficient	EFA Weight
TKQ: Market objectivity $\alpha = 0.885$			
TKQ1: The development of the domestic real estate market.	3.58	.825	.764
TKQ2: The development of foreign real estate markets.	3.51	.746	.692
TKQ3: The evolution of technology	3.82	.761	.790
HLPL: Legal Corridor $\alpha = 0.840$			
HLPL1: The provisions of the law are unclear and there are no specific regulations.	3.59	.623	.597
HLPL2: The current provisions of the law make it difficult to verify the information of the parties involved.	3.51	.716	.704
HLPL3: The regulation of the law negatively impacts the modification of the Blockchain.	3.37	.654	.718
HLPL4: The law regulating specifically on Blockchain will create many advantages for application in the field of real estate business.	3.68	.717	
TCCQ: Subjective standards $\alpha = 0.856$			
TCCQ1: The information on the mass media.	3.63	.703	.670
TCCQ2: Thanks to the impact of people who have an impact.	3.55	.786	.750
TCCQ3: I am attracted to projects applying blockchain technology in the field of real estate through scientific and technological conferences.	3.57	.699	.771
TN: Voluntary $\alpha = 0.871$			
TN1: I find the application of technology very helpful in all areas of life.	3.81	.756	.799
TN2: I realize that the application of Blockchain technology is essential to catch up with the 4.0 technology revolution.	3.75	.741	.754
TN3: I hope the legal corridor on the application of Blockchain technology in the field of real estate in Vietnam will be more complete in the future.	3.94	.760	.753
CNRR: Risk Perception $\alpha = 0.837$			
CNRR1: The application of blockchain technology in the field of real estate does not have a specific legal corridor, so I do not invest.	3.45	.654	.825
CNRR2: I see the recovery of capital when investing in real estate through the application of Blockchain technology is heavily dependent on co-owners.	3.49	.796	.788
CNRR3: I am afraid of fraudulent activities through Blockchain technology to benefit myself.	3.59	.591	
CNTHI: Perceived usefulness $\alpha = 0.822$			

CNTH1: The application of Blockchain technology contributes to promoting the development in the real estate market.	3.64	.743	.684
CNTH2: The application of Blockchain technology helps to make real estate transactions fast and save (cost, time, ...).	3.69	.821	.808
CNTH3: Systems using Blockchain technology will bring outstanding benefits in terms of security to users.	3.57	.699	
QDUD: Application Decision $\alpha = 0.859$			
QDUD1: I feel satisfied with what the application of Blockchain technology in the field of real estate brings.	3.59	.690	.929
QDUD2: I will continue to apply Blockchain technology in the field of real estate.	3.37	.821	.862
QDUD3: I would like to introduce to everyone about the application of Blockchain in the field of real estate.	3.21	.693	.860

The results in Table 1 show that all scales have a Cronbach Alpha > 0.6 and a Corrected Item (Total Correlation) coefficient > 0.3. Cronbach alpha results for the scale meet the reliability requirements. Specifically, Cronbach Alpha results show that the objective factor of the market is 0.885, the legal corridor factor is 0.840, the propaganda factor is 0.856, the cognitive factor is 0.871, the risk perception factor is 0.837, the effective expectation factor is 0.822, the application decision factor is 0.859.

+ EFA scale results

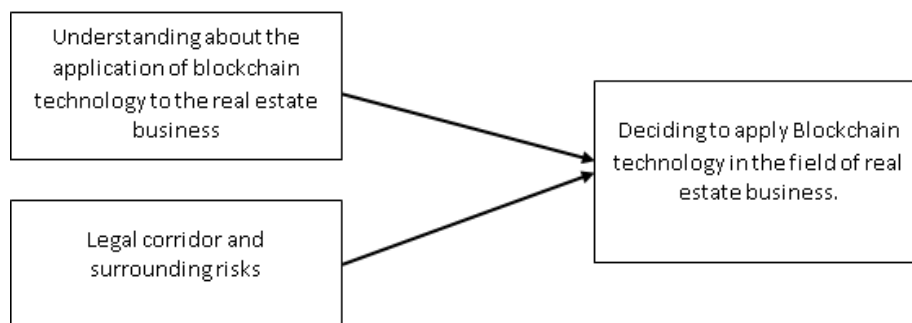
The results of the study used the KMO and Bartlett scales.

**Table 2. Study results using KMO and Bartlett scales.**

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.685
Bartlett's Test of Sphericity	Approx. Chi-Square	220.846
	Df	3
	Sig.	.000

Table 2 illustrates Bartlett test results between variables in the population Sig = 0.000 (all less than 0.05) and shows that the observed variables are correlated with each other. The KMO coefficients are all greater than 0.5 ( $0.5 < KMO = 0.685 < 1$ ) so the analysis of the above EFA coefficients is appropriate. After performing the Cronbach Alpha and KMO tests, the authors conducted an EFA exploratory factor analysis to ensure the reliability of the scale. The results in Table 2 indicate that the EFA weighting values for each variable have a meaning greater than 0.5 for the concept they measure. Therefore, the initial criteria are significantly related to the extraction factor. On that basis, the results of this study suggest that the scales measured different research concepts. In addition, it can be concluded that the scales and variables in the study all reached convergent values and discriminant values, demonstrating reliability and suitability for multiple linear regression analysis.

In addition, it can be concluded that the scales and variables in the study all reached convergent values and discriminant values, demonstrating reliability and suitability for multiple linear regression analysis.



**Fig 2. Formal research model after adjustment.**

+ After EFA analysis, the research team conducts regression analysis to determine the degree of impact of independent variables on the dependent variable

Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.717a	.514	.507	.413	2.310
a. Predictors: (Constant), DL2, DL1					
b. Dependent Variable: PT					

**Table 3. Check the fit of the model.**

ANOVA						
	Model	Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	26.498	2	13.249	77.679	.000b
	Residual	25.073	147	.171		
	Total	51.571	149			
a. Dependent Variable: PT						
b. Predictors: (Constant), DL2, DL1						

With R<sup>2</sup> corrected at table 3 by 0. 507. This value explains that with 2 independent variables included in the analysis affects 50.7% of the change of the dependent variable. The F (sig) of the dependent variable in table 4 is less than 0.05 – which means that the research model makes sense to infer overall.

**Table 4. Pearson Correlation Analysis**

Coefficients								
Model	B	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		Std. Error	Beta				VIF	
1	(Constant)	1.241	.177		7.000	.000		
	DL1: Understanding about the application of blockchain technology in the real estate business	.384	.062	.504	6.207	.000	.501	1.994
	DL2: Legal corridors and surrounding risks	.213	.065	.266	3.271	.001	.501	1.994
a. Dependent Variable: PT: application decision								
Table 5. The regression results using the Enter Coefficientsa method.								

Sig. the values of the variables in table 5 are all less than 0.05, meaning that the variables are statistically significant in the model. The Variance Inflation Factor (VIF) magnification factor in Table 5 of each factor has a small value of 1,994, showing that the regression model does not violate multi-linearity, meaning that the independent variables are closely correlated. The independent factors all affect the dependent factors.

The construction regression equation takes the form:  $PT = 0.504*DL1 + 0.266*DL2$

The Beta result of the Normalization Coefficient indicates the importance of each variable independent of the dependent variable. The greater the absolute value of the normalized regression coefficient, the greater the impact. Of the two factors, the understanding factor surrounding the application of blockchain technology to real estate affects the application decision more strongly than the legal corridor factor and the surrounding risks. People will easily make the decision to apply Blockchain technology in the field of real estate business if they have a certain understanding of it along with a clear and specific legal corridor.



After conducting the survey, the research team found that the application of blockchain technology to the real estate business is necessary. Because in the 4.0 era when the world is moving towards digital technology to serve the needs of people in all fields, and improve the quality of life. Blockchain is an application that is doing very well in this, especially in the real estate business. Not only that, Blockchain also brings practical benefits to society.

This application is an irreversible trend, it brings practical benefits to society. For business entities that are businesses that help deploy transactions more effectively, minimize intermediary costs, information transparency, minimize fraud, prevent the spread of fake news causing virtual land fever, smart contract applications, etc. For the state to make management easier, ensuring transparency, high traceability, the ability to eliminate intermediaries, etc. This application is an irreversible trend, it brings practical benefits to society, not only for business entities but also for the State, especially in the context of the 4.0 revolution, digital society and digital economy. Therefore, in order to create favorable conditions for the application of blockchain technology to real estate business, it is necessary to complete the legal framework.

#### **4. ANALYZE THE LEGAL ISSUES ARISING WHEN APPLYING BLOCKCHAIN TECHNOLOGY IN THE FIELD OF REAL ESTATE BUSINESS AND THE EXPERIENCE OF SOME COUNTRIES.**

##### **4.1. Analyze the legal issues arising when applying Blockchain technology in the field of real estate business.**

There are a number of challenges that blockchain technology must overcome in order to be considered as reliable, legitimate, and secure as real estate transportation systems.

Currently the European Union has 28 member states so the creation of a blockchain database that gathers all EU real estate transactions of any kind (buy, rent, transfer, etc.) can certainly make verification time-consuming and costly.

For example, the costs associated with smart contracts and the scalability of the network, a problem that exists with bitcoin, Ethereum and other altcoins (Preukschat, 2017) is quite a lot... A number of developers and researchers are working to solve this problem, and one of them believes that they have found a solution (e.g. iota free a cryptocurrency for the internet of things, with the Tangle system, where no miners exist, Popov, 2018); however, for a real estate transmission system, controlling these costs (e.g., with a legally regulated blockchain where there is a central authority that recounts prices or regulates the authority mechanism with the authority who validates transactions) would be desirable, so that this is not an obstacle preventing people from registering their rights.

On the other hand, there are some specific challenges to be faced when implementing a real estate transit system via blockchain: Controlling the IDs of parties; the legality of contracts and the verification and protection of rights in REM; the registration of co-ownership; the modification of the ledger.

Faced with these challenges, countries around the world have:

##### ***Firstly, for the verification of the identity of the parties involved***

If blockchain technology is deployed to make real estate transactions, one of the most important issues that need to be addressed is the need to check the real ID of the parties, which is the issue of public control. It is essential to give the blockchain an official ID to implement a real estate transit system and one that can contribute not only to providing greater security but also to ensuring that digital owners can actually prove their rights to a given asset. To overcome this problem, IDs must be managed by a central authority (preventing the complete distribution of the real estate market) or by the blockchain itself, as long as the identity of the user is recognized by the countries.

Businesses of the European Union have implemented the application of Blockchain technology using an official ID. For example, the company Accenture has signed a formal agreement with the Netherlands to implement a blockchain-based ID that allows travelers to share their biometrics with customization and border control in advance, enabling the coordination of traveler data (World Economic Forum, 2018).

***Second, control the legality and validity of the contract***

Lawyers, notaries, and even land registries in some jurisdictions ensure that a certain real estate transaction is concluded in accordance with minimum legal requirements, and they inform the buyer of previous obstacles and rights to the property.

Therefore, it is important when designing a blockchain to allow the purchase or mortgage of a property, this control is implemented to avoid removing some essential rights of the buyer when implementing it. In Spain, artificial intelligence (AI) is used to compare the terms written in a smart contract with a database of unfair terms (for example, with a registry of general terms and conditions, such as the Spanish Registry de las Condiciones Generales de la Contratación). In lease agreements, there is currently no need to register in the land registry, blockchain along with AI can give tenants more control over the contents of the contract. In the United Arab Emirates (UAE), the UAE government is setting up its own blockchain system to record all real estate contracts and seeks to contact utility companies such as the Dubai Electricity and Water Authority (DEWA). This system allows tenants to make electronic payments, make paperless transactions and save costs.

***Third, co-ownership***

The application of blockchain technology in the real estate business leads to problems related to the determination of the co-ownership rights of the entities involved in the transaction. Because real estate is an asset with certain characteristics from the point of view of each country, each legal system has a different way of regulating and managing. Proper identification of the obligations and rights held by the right owner will be essential to know what obstacles the property has and what rights the owner has.

In Europe, the identification of rights can be done through tokens or colored coins, i.e. attaching a certain right to a token in such a way that when parties transfer tokens over the blockchain, this right is also created or transferred (EU Parliament, 2018). For example, Altestate has created a token that represents the right to housing, which users can use to sell their square meters of property. This is also the case with Homelend, which allows parties to create mortgages through tokens. The problem, however, is that the existence of several blockchains with different rights to the same asset would complicate the determination of the entity's rights as well as the execution of transactions. Therefore, it is essential to have a formal distributed ledger that collects appropriate information about a given asset, in order to protect legal relations between citizens or at least, to include land registry information about the blockchain of encrypted assets

***Fourth, the possibility of modifying the blockchain***

The ability to change the owner of an asset or modify a certain right or property in certain situations is unavoidable. For example, in the case of a minor who acquires property without sufficient capacity or in the case of an act claiming ownership, the ownership of the property may be subject to a lawsuit and the owner may be changed. The same can happen in cases where illegal activities need to be withdrawn when there are operational errors, or even when the actual situation of the asset changes. Accenture is working on a prototype that would allow for the modification of blockchains, whereby some administrators of the blockchain may have the ability to modify it, which could be used by public authorities to change the blockchain if necessary (for example, it could be a solution to allow the heir to have ownership of a certain

property without the explicit consent of the testator or when this type of application is not suitable for the disintermediation that the blockchain wants to strengthen, but it is essential to maintain the current level of protection given to parties in the EU legal system).

***Legal issues may also arise from activities such as:***

+ There are still uncertainties in the implementation of blockchain-based ownership rights. This is one of the issues to consider if you want to participate in trading for business purposes. Coindesk, a leading blockchain news source, describes the difficulties of applying for land ownership on the blockchain (Reese, 2017). Ghana wants to overcome land registration legality restrictions, so in 2018 it adopted a blockchain-based land registration system that has not been effective with other national policies, such as between the Security Commission and the Ghana Transaction Commission on the issue of cryptocurrencies. Therefore, it is necessary to consider strategic and operational factors in order to effectively apply Blockchain technology to the real estate business.

+ The legality of smart contracts and the interpretation of smart contract language (processing language, computer code) into natural language. According to Ullah et al., barriers to digitalization in general in the Australian real estate sector including blockchain adoption barriers are very complex (Ullah et al., 2021). One of those barriers is the legality of smart contracts. However, the recent interpretation of smart contract language (processing language, computer code) into natural language has received more attention. For example, how to understand the content of smart contracts and the rules of individual binding contracts can become an issue unless natural language is used, for example, in the metadata of smart contracts (Garcia-Teruel and Simo´n-Moreno, 2021).

+ Issues related to ownership certificate. Countries such as the United States and Canada use the Torrens system (which is a certificate of ownership of assets issued by government agencies in some states) to allow the transfer of assets without seeking ownership. Therefore, it is necessary to have appropriate legal tools in this regard.

+ Virtual currency is often used to pay transaction fees for a smart contract to be created and executed on a given block, such as fees for a contract to be added to the chain and executed. For example, in the case of the Ethereum blockchain (EVM), smart contracts are executed on the Ethereum Virtual Machine, and this payment is made through the Ether cryptocurrency, known as “gas” (Huang Y. Wang B., Wang Y., 2020). With the legal risks of cryptocurrencies, there are currently only two countries in the world that recognize this currency, the Central African Republic and El Salvador.

#### **4.2. Experience of some countries.**

On the basis of analyzing the legal situation of some countries in the world when applying blockchain technology to the real estate business, applying in the context and trend of applying blockchain technology in the field of real estate in Vietnam, the research team offers a number of international legal experiences that can serve as lessons for Vietnam in perfecting the law to apply blockchain technology in the field of real estate business.

In order to provide a protocol that allows real estate transactions to be completed in a complete manner, ensuring fairness for both the contracting party and the third party as the current procedures in the traditional form of real estate purchase and sale, this technology must meet the following criteria:

**Firstly**, it must be ensured that all such smart contracts are technically justified and legally reviewed so that they comply with the requirements under applicable laws and regulations. There are countries in the world that have been using smart contracts with legal validity and have the same basic requirements as a paper contract, such as the United Arab Emirates, the Democratic Republic of Georgia, etc.

**Second,** Second, ensure the validity of the IDs. This is an important requirement to implement if you want to apply blockchain technology in the field of real estate business. Recognizing this importance, the world's leading countries in this field such as the Netherlands, Estonia, Canada,...

**Third,** the modifiable capabilities of Blockchain. To ensure the inherent features of the Blockchain, this amendment requires the participation of a competent authority, capable of creating a new transaction that benefits the real owner. Apply this amendment in case of necessity. In today's world, Spain and the European Union are leading the way in authorizing this amendment.

**Fourth,** build a smart contract metadata system to help better define the content of the contract expressed through the code of the smart contract. This tool helps to convert smart contract language (processing language, computer code) to natural language or vice versa (Garcia-Teruel and Simo' n-Moreno, 2021). This is an issue that has received the attention of many countries, including Australia.

**Thursday,** Tokenization of real estate. This is an experience that needs to be considered to improve the law so that it is legally responsive and technically appropriate. Since tokenization can significantly stabilize the crypto economy, reducing the volatility of the digital currency market by ensuring such a "tokenization" with real estate will increase the capitalization of the crypto economy.

**Sixth,** establishing ownership rights when conducting transactions on the blockchain technology platform. This is one of the issues to be concerned about if you want to participate in transactions for business purposes. In order to effectively apply Blockchain technology to the real estate business, it is necessary to pay attention to this issue. The United States and Canada are experienced countries that can learn to solve this problem.

## **5. SOME RECOMMENDATIONS TO IMPROVE THE LAW OF VIETNAM TO APPLY BLOCKCHAIN TECHNOLOGY IN THE FIELD OF REAL ESTATE BUSINESS**

### **5.1. Legal issues arising when applying blockchain technology in the field of real estate business in Vietnam.**

Currently, Vietnamese law does not have a specific regulation for smart contracts, personal ID systems, and co-ownership of real estate through transactions made on blockchain platforms. These legal issues can be summarized as follows:

**First,** in terms of smart contracts, transactions can only be executed when all conditions have been satisfied; in theory, there is no chance for a transaction to occur without all conditions in the contract having been fulfilled. But how to ensure that Blockchain smart contracts still meet all the basic requirements of a paper contract? This is why all the terms of the contract must be clear, and all parties must understand all the terms before agreeing and signing the contract.

This contract has a legal basis for adjustment. These are the Law on E-Transactions 2005, Decree 52/2013 on e-commerce and Decree 85/2021 supplementing and amending a number of articles of Decree 52/2013. The Law on Electronic Transactions has recognized the legal value of electronic contracts and set forth the principle of entering into and executing electronic contracts, whereby the signing and execution of electronic contracts must comply with the provisions of the Law on Electronic Transactions and the law on contracts. Similarly, in e-commerce, Decree 52/2013, as amended and supplemented by Decree 85/2021 (hereinafter referred to as the Decree on e-commerce), also acknowledges the use of automatic information systems in entering into contracts (Article 13 of the Decree on e-commerce). In addition, Vietnamese law has also recognized the legal value of e-signatures in general, digital signatures in particular in the Law on E-Transactions and Decree 130/2018 detailing the implementation of the Law on E-Transactions on digital signatures and digital signature certification services. However, smart contracts still have certain peculiarities that require separate regulation of the law.

In essence, smart contracts are legal terms that are translated into a programming language, so understanding these codes is sometimes not easy for the parties. For complex contracts, the parties will need to rely on the assistance of experts to write code for the contract. This work will likely lead to problems related to the determination of the legal obligations and responsibilities of experts when reflecting the will of the parties through the code, for example in the case of faulty code.

Modifying the terms of a smart contract or terminating a smart contract is not the same as a traditional contract or other conventional electronic contract. As analyzed above, once the smart contract is established, it will be difficult for the parties to change the terms of the contract, as these terms are already expressed in codes. These codes will automatically run when the condition of the code is met. At that time, the contract will be automatically executed. Therefore, the general provisions of the law on contracts or electronic contracts are difficult to apply.

Besides, the parties to the smart contract may be located in different countries, so it is difficult to be sure that they can understand, agree and have a general view of the conditions of the contract. The problem with smart contracts with this foreign element is the determination of the governing law and the dispute settlement body. Based on the general principles of international justice, the parties are allowed to choose the governing law and the agency to settle disputes. However, in cases where there is no choice, it is not easy to determine the dispute settlement agency and the governing law. Disputes related to smart contracts will be difficult to determine the residence and headquarters of the parties when the parties use virtual identities, it is difficult to determine the location of the contract object when it is virtual products, or where the contract is entered into and or where the contract is executed when the contract is concluded and implemented on the blockchain system while the provisions of current law are to determine the dispute resolution authority as well as to determine the applicable law mainly based on factors. territorial connection, determined based on the ability to determine the location of the subject, the location of the object of the contract, or where to conduct on the territory of a certain legal system. Therefore, this is also one of the legal issues that need to be paid attention to and perfected.

**Second**, about the personal ID system According to the current law, in order for a real estate transfer to be considered legal, it is necessary to have enough information about the seller, the buyer, have a certificate of use rights and ownership of the property, and at the same time must fully fulfill tax obligations, registration fees and charges. Meanwhile, the execution of transactions through the blockchain can be done through the virtual IDs of the entities. In addition, one of the current issues is the confidentiality of the information of the subjects. Nowadays, there are more and more leaks, stealing user data from social media platforms and large companies. From there, the entities involved in any transaction, including transactions in the field of real estate business when applying blockchain technology, can steal information, or use incorrect information to participate in transactions... resulting in making the transactions illegal and unfavorable for participants in the transaction. As a result, transactions become illegal, detrimental to transaction participants. So the challenge is to have a personal ID system to overcome the above limitations. Currently, Vietnamese law is aiming to build an electronic identification system for individuals as well as organizations with a variety of related documents such as the Law on Citizen Identity, the Law on Information Technology, the Law on Electronic Transactions, especially Decree 59/2022 regulating electronic identification and authentication (hereinafter referred to as Decree 59/2022). However, the question is how these electronic identities can be used safely, without being used in an unauthorized way, affecting the legitimate rights and interests of the subjects. Issues related to information protection in the network environment are also being regulated by a number of laws such as the Law on Cyber Information Security and the Law on Cyber Security.

**Thirdly**, the fact that real estate is divided into thousands of investment opportunities, sold to thousands of people through cryptocurrency technology on the blockchain platform (real estate blockchain) is very risky. These are:

(1) The issue of co-ownership of digital assets of the subjects: The failure to establish ownership rights is named in the certificate of land use rights and house ownership by that group of joint buyers in the form of co-ownership to determine the right to enjoy income rather than rights to property (property rights include rights: possession, use, disposal). The joint purchase of real estate also generates many inadequacies as when the subject wants to sell his share will handle how? Does the transferee of the proof of stake collect the proceeds or does the transferee of the token verify the amount of money invested by the transferee through the token to collect the proceeds? Or will the owner have to comply with the participation until the right to sell? It is true that the questions have no end and there is no law document that makes this legal corridor clear. To solve this problem, it is necessary to determine the nature of real estate business transactions made on the blockchain platform.

(2) Property management problem: The general purchase will lead to the problem of identifying the manager. The manager must be a person authorized by the co-owners. In the case of shared real estate is the house, the authorized party does not manage well, causing the value of the house to decrease, and all buyers suffer. If the shared real estate is purchased in a form formed in the future, the risk of losing money is even greater because of legal problems, slow progress or suspension, withdrawal is very common in the Vietnamese market. Or in case the manager takes the real estate as collateral at the bank, who will control it because all buyers have no ownership rights on the certificate, no right to use and dispose of such property in accordance with current laws.

(3) The issue of real estate disposition: According to the provisions of Vietnamese law on co-ownership of real estate (in the name of the book), the decision to sell real estate to close profits requires the consent of all owners. 999 people want to sell and one person does not want to, the transaction will be blocked, not to mention the issue of divorce or inheritance At this time, the person who wants to withdraw can only sell his ownership to others in the system, the risk of selling cheap is completely possible. Conversely, those who want to collect the entire ownership will have to buy high prices, invisible medium must buy real estate higher than the market price. There is a regulation that only requires 51% of the owner to agree, the sale of real estate will take place. However, if 51% is owned by the token seller, they can completely sell the product to their own people, which means the remaining 49% will suffer.

(4) Real estate valuation problem: Because the selection and valuation of real estate depend on the token issuer, this unit can completely overvalue the product compared to the market price. Buyers, because of the psychology of only spending a few million VND/investment, easily ignore this. On a large scale, the act of high valuation not only damages buyers but also contributes to pushing up real estate prices, adversely affecting the general market.

In addition, the psychology of the majority of Vietnamese people also significantly affects the application of blockchain technology in real estate business. A large part of Vietnamese people have a suspicious mentality, and fear of being scammed, even when approaching new technologies such as blockchain is a big barrier because a number of projects take advantage of the novelty of blockchain to cheat, causing them to lose trust when hearing about mainstream blockchain projects. Giving them the fear of approaching and investing, thereby making the real estate blockchain in the country develop in a more limited way.

## 5.2. Some recommendations to improve the law of Vietnam to apply Blockchain technology in the field of real estate business.

In terms of orientation to improve Vietnamese law to apply blockchain technology in the field of real estate business With the goal of being able to apply blockchain technology in the field of real estate business effectively, promoting the strengths and advantages of blockchain technology while protecting the legitimate rights and interests of entities involved in real estate business transactions, the completion of the law needs to stick to the following directions:

*Firstly*, it is necessary to ensure how to promote and create favorable conditions for the use of blockchain technology, not create barriers when applying this technology. The advantages of applying blockchain technology in the real estate business are undeniable and tend to be irreversible. Therefore, it is necessary to create a legal framework to create favorable conditions for the application of this technology in the field of real estate business.

*Secondly*, the completion of the provisions of the law aims to ensure the consistency of the legal system when applying blockchain technology in the field of real estate business so that the implementation of the law is favorable, and free from contradictions and conflicts. Because this is an issue related to many legal areas such as law on contracts, law on electronic transactions, real estate business law, law on ensuring cyberinformation security, personal data protection, etc.

*Thirdly*, it is necessary to overcome the limitations and risks of using blockchain technology. As analyzed above, participants in blockchain technology can face a variety of risks that are beyond their control, such as information theft, unauthorized use of ID, being hacked into data systems, etc. These issues need to be controlled through the provisions of the law to ensure the safety of real estate business transactions made on blockchain technology.

*Finally*, the application of blockchain technology in the field of real estate business is carried out beyond national and territorial borders. Therefore, in order to create conditions for this application to develop, it is necessary to build a harmonious legal framework between countries and territories.

### ***Specific Recommendations***

Based on the current Vietnamese law on the field of real estate business, and the legal experience drawn from the previous countries, the research team would like to offer some specific solutions as follows:

*First*, clearly define the nature of real estate business transactions conducted on the blockchain technology platform.

This is an important issue to overcome the shortcomings in determining the ownership of the entity involved in real estate transactions on the blockchain platform, as well as solving the problem of real estate valuation. The subdivision of real estate in parts and traded on the blockchain technology platform has both the characteristics of property transactions and the characteristics of transactions on the stock market. Therefore, the problem posed for Vietnamese law today is the need to clearly define the nature of real estate business transactions conducted on the blockchain technology platform. According to the team, in order to determine the nature of these transactions, it is necessary to adhere to the principle of technological neutrality. Accordingly, real estate business transactions are made easier on the blockchain technology platform, not because of the blockchain technology that causes the nature of real estate business transactions to be transformed. The next issue of the law will be to review relevant regulations such as notarization, ownership certificates for co-owners of real estate, etc. in order to create favorable conditions for these transactions.

*Second*, ensure the safety of IDs of individuals involved in real estate transactions.

Currently, Vietnamese law has regulations on electronic identification and electronic authentication. However, with the risks in information security and cybersecurity, the use of electronic identifiers can seriously affect the rights and interests of related entities.

To solve this problem, it is possible to work towards a solution so that the Blockchain is linked to an official digital ID, which only allows transactions with legitimate access. There is also a need to work towards the possibility of using a cross-border connection ID. At that time, domestic actors could connect to other national blockchains to enhance cross-border transactions. However, even when implementing this type of blockchain, there are certain challenges that need to be solved. For example, creating a better mechanism to control the true consent of the parties by biometric analysis or developing a full blockchain environment to ensure that information about a transaction is properly understood through a computer.

**Third**, complete the legal corridor of smart contracts.

Many countries around the world have adjusted and applied smart contracts using digital technology in the conclusion and implementation of areas such as traditional contracts due to the impact of the Industrial Revolution 4.0. However, in the Vietnamese legal system in general and the field of contract law in particular, smart contracts are a new issue that has not been recognized. Therefore, there are certain challenges, the following are some solutions to overcome the above shortcomings:

There is recognition of the legal value of smart contracts. Currently, the law is indirectly regulating legal issues related to smart contracts when meeting the criteria and conditions of an electronic contract or a legal transaction. Therefore, the problem of applying Smart Contracts in practice is very difficult because it can make businesses timid and afraid. To address the above situation, Vietnamese law should be adjusted in the direction of officially recognizing the legal value of Smart Contracts.

Provide specific instructions to determine the validity of the Smart Contract. After being recognized as legal, Smart Contracts need to have clearer regulations on their effectiveness to be able to apply to social practices. The Vietnamese government can refer to the US and Poland's treatment as issuing regulations on "Proof of Consent" or the State can continue to study the establishment of a specialized agency, carry out the registration, use to limit and manage the number of participants.

There are specific regulations on the issue of signing a contract. Currently, Vietnamese law does not clearly regulate the adjustment of the time of signing the contract and determining the place of signing the contract. Vietnam can refer to the provisions of Thai law in determining the time of signing to make reasonable supplements to the current regulations. Moreover, more open regulations should be put in place to solve problems related to the place of engagement.

There should be a regulation that allows competent state agencies to modify the blockchain in certain cases, such as when requested by a court. Knowing that modifying the blockchain is a difficult task to do in blockchain technology. Therefore, the law needs to allow the ability to modify the blockchain under certain circumstances.

There should be specific regulations guiding the implementation of the contract. Vietnamese law should be studied in a more specific way to find the appropriate provisions in the implementation of the contract. The key point to be able to find the answers to the problems and contradictions when going to learn the nature of the application. From there, it is possible to make legal provisions for the guidance on the implementation of Smart Contracts.

**Fourth**, ensure the legality of tokens in real estate tokenization. This is an opportunity for investors who want to establish the right to buy or rent property in the future. This legal guarantee also helps to



replace traditional paperwork, buyers and sellers of real estate can use tokens to make transactions in a certain process.

**Fifth**, perfecting the law on digital currency when participating in transactions Digital money management policy should aim to prevent illegal transactions and exchanges such as money laundering, terrorist financing, etc. Currently, digital currency has been exploited by subjects in many illegal activities because trading this type of asset is completely possible with the function of anonymity.

**Sixth**, the regulation of smart contract language should also be formed. Because the translation of the language from the smart contract language to the common language is necessary for the parties to the transaction, it is aimed at ensuring the legal rights and interests of the parties involved.

**Seventh**, clearly identify the problems in the implementation of blockchain in the blockchain, they include operational and strategic factors. Based on the specific local and national context should be included in the analysis when deciding on the application of blockchain.

In addition to solutions to improve the legal framework, it is necessary to simultaneously implement the following measures to facilitate the application of blockchain technology in the real estate business effectively. Details are as follows:

*On the side of state management agencies:*

- State management agencies need to have management over the application of blockchain technology in the fields of the economy in general and in the real estate sector in particular. The implementation of the state management function for the application of blockchain technology in the real estate sector will ensure the transfer of real estate in the best way, in order to protect the legitimate rights and interests of the parties.

- Competent state agencies need to build a unified electronic identification system. The current situation shows that there are too many databases containing electronic identifiers of individuals and organizations (National Population Database, Citizen Identification Database, National Immigration Database, other databases – Decree 59/2022). This situation can lead to the risk of inconsistency in the identification of an individual's electronic identity. Therefore, it is necessary to build a single database and state management agencies in accessible areas.

- State agencies also need to build a network of unified state management agencies in the field of real estate business, including transactions made on the blockchain technology platform to facilitate the recognition of the legality of transactions, of the entities involved in real estate transactions.

- The organization disseminates the law on real estate business through blockchain technology so that each individual and organization can understand the provisions of the law in order to best protect their legitimate rights and interests. Through the results of the survey analyzed in the study, the most important factor in deciding the application of blockchain technology in the field of real estate business is the understanding of blockchain technology and the application of blockchain technology in the field of real estate business. The greater the understanding, the deeper the decision making to apply this technology and vice versa. In addition, in order to fully protect the legitimate rights and interests of entities involved in real estate transactions on the blockchain technology platform, entities need to have a certain understanding of this issue as well as the legal issues raised, and the risks that may occur when participating.

*On the side of enterprises, organizations and individuals*

- Encourage funding from enterprises in enhancing legal access, especially in the era of the 4.0 industrial revolution, to help effectively apply blockchain technology in the field of real estate business,

both helping to achieve business goals and maximizing the protection of the legitimate rights and interests of the participants.

- Voting, honoring and rewarding enterprises and individuals who are entrepreneurs to perform well in building, protecting and implementing the law, in applying technology to business activities in accordance with the law; attracting and praising useful initiatives in supporting legal access and improving people's capacity to access the law.

- Strengthen and improve the efficiency of the customer care department and receiving channels to answer petitions, reflect, answer, advise and support issues related to the application of Blockchain technology in the field of real estate business and relevant laws.

- For each individual business, it is necessary to have an understanding of the law in the field of real estate business on the basis of blockchain technology. Thus, it is possible to protect its legitimate rights and interests to the maximum.

## **6. CONCLUSIONS**

In summary, the application of blockchain technology in the field of real estate business is a prominent trend in economies around the world and in Vietnam. Blockchain in the real estate business sector has brought many opportunities for the Vietnamese economy in general and businesses, such as reaching more customers everywhere in the world. The purpose of Blockchain technology application in the field of real estate business is to solve the problems of information transparency, eliminate the geographical gap between countries, and overcome the limitations of traditional transactions. The research team analyzed the legal issues arising when applying Blockchain technology in the field of real estate business, thereby drawing on the experience of a number of countries (EU, Spain, Netherlands, Ukraine, ...), conducted an analysis of factors affecting the decision to apply this technology in Vietnam to understand the actual situation and aim to complete the legal corridor in Vietnam. Specifically, the legality of smart contracts, the issue of identifying and securing the IDs of the parties involved, and some of the risks faced when jointly buying real estate on the blockchain technology platform are the main legal challenges faced by countries ahead in this field; The legal corridor and surrounding risks and understanding around the application of blockchain technology in the field of real estate business are two factors that strongly influence the decision to apply Blockchain technology in the field of real estate business in Vietnam. The results show that the legal corridor is an important barrier to the application of blockchain technology in the real estate business. Therefore, from the legislators; the state; each organization and individual needs to make changes to suit the development situation of the 4.0 industrialization revolution but still ensure the rights and obligations of the subjects, especially in the field of real estate business today, not only to ensure rights and obligations but also to overcome the limitations of the previous real estate business in legal terms. Although this study has used qualitative research methods combined quantitatively, the sample size can be considered modest when said that on a national scale, the disparity between countries ahead in the field of technology in the world (US, UK, Switzerland, ...) is developed countries compared to Vietnam as a developing country in terms of facilities, economic conditions, human factors. As a next step, future research efforts will focus on expanding the sample size and developing new data analysis techniques that account for the factors affecting the application of Blockchain technology in the real estate business, continuing to research to thoroughly solve the legal issues arising from the application of Blockchain technology in the real estate business. That way, the research results can be applied more effectively to Vietnam.

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## **FACTORS AFFECTING GREEN BANKING IMPLEMENTATION IN VIETNAM: EMPIRICAL STUDY AT THE LISTED COMMERCIAL BANKS ON HO CHI MINH CITY STOCK EXCHANGE**

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**Abstract:** *In Vietnam, the number of studies on green banking is still quite modest. This is still an open field, with many gaps. Therefore, it is really necessary to study green banks to estimate the factors affecting the implementation of green banks in Vietnam, identifying the factors affecting the implementation of green banking. The results of study will help Government, commercial banks, financial institutions; businesses and people to understand the role and impact of green banks on the stable and sustainable development of businesses in particular and on the economy. The study was conducted with a dataset of 200 survey results. The study used the method of reliability analysis of the scale using Cronbach/Alpha coefficients, analyzing EFA (Exploratory Factor Analysis) and extracted variables for multivariate regression analysis. The results show that a positive impact of stakeholder pressure, supportive policies, potential benefits and macro factors on the implementation of green banking in Vietnam. At the same time, the research proposed a number of solutions to strengthen the implementation of green banking in Vietnam.*

**Keywords:** *Sustainable economy, green economy, green banking, green finance, sustainable development.*

### **1. INTRODUCTION**

Climate change, depletion of natural resources, polluted environment is affecting the world. According UN ESCAP, “Green Bank” is defined as the operations of banks, incentives for environmental activities and reduces carbon emissions, such as: encouraging customers to use green products, services; imposing environmental standards when approved loan or grant preferential credits for projects that reduce CO<sub>2</sub>, renewable energy... Other definition, Green Bank works like a traditional bank and provide superior service for investors and customers while implementing programs useful to the community and the environment. The green bank is not a pure business operation for corporate social responsibility (CSR), also not entirely pure business for profit; it is a new combination to ensure the harmonious and sustainable about the economy - environment – society.

After nearly 25 years since international integration, the economy of Vietnam has been recognized as one of the most successful developing countries in the world. However, facing the danger of environment, for developing countries like Vietnam, Green Bank is a new concept that requires the environmental protection and economic growth trade-offs. In Vietnam, since 9/2012, the Prime Minister has approved the “Vietnam Green Growth Strategy (VGGGS) for the period 2011-2020 with a vision to 2050”, in order to contribute to responding to climate change, reducing poverty and ensuring sustainable economic development, and the banking system is a link in the implementation of this national strategy through the implementation of “banking” green goods”. The VGGGS aims to increasing the resource-efficiency of the economy, and increase sustainability while achieving development and economic objectives. Vietnamese government also built Vietnam Green Growth Action Plan (VGGAP) in 2014. Sustainable development with green growth is becoming a common development trend of countries around the world because green growth can

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simultaneously solve problems between growth and the environment-society, ensuring economic growth with environmental and social protection. Through the role of providing capital to the economy, banking system plays an important role in realizing green growth with mechanisms to encourage investment in environmentally friendly projects, banks have gradually implemented to become green banks. Therefore, it is necessary to research to come up with solutions to develop the implementation of green banking, contributing to the sustainable development of the banking system as well as the Vietnamese economy.

## 2. LITERATURE REVIEW

### *\* Green Bank*

Green banking is a sustainable bank whereby investment decisions need to look at the big picture and act in a way that benefits consumers, economically, socially and environmentally. At that time, there was a close relationship between the bank and economic, social and environmental factors. Banks can only develop sustainably if they adjust their interests with social and environmental interests (Imeson and Sim, 2010). Using this approach, the Indian Institute of Banking Technology Research and Development (IDRBT), defines green banking as a term for practices and guidelines that show a sustainable bank in terms of economic, environmental and social aspects (IDRBT, 2013). In a narrow sense, a green bank is a bank whose professional activities are aimed at encouraging environmental activities and reducing carbon emissions within the bank as well as outside the banking system.

Approached in both directions, green banking is defined as “An ethical, socially responsible bank and a practical bank. In addition, it is certain that the green bank offers green products, supports activities that do not create risks to the environment and protect the environment. Moreover, it is the responsibility of the green bank to protect the planet from climate change, the greenhouse effect and reducing air quality, with the goal of ensuring practical economic development.”

### *Levels of green bank*

Kaeufer (2010) launched green banking under the perspective of providing green banking and financial services. At the same time, Kaeufer (2010) came up with a 5-level green banking model, namely:

- **Level 1:** Carry out side activities, by sponsoring «green» events and participating in public activities (most banks are at this level);

- **Level 2:** Separating project development and business activities, in which the bank develops separate green products and services (accounting for only a small proportion) to add to the portfolio of traditional banking products;

- **Level 3:** Systematic business operations, in which most of the bank’s processes and products comply with the “green” principle, the bank’s organizational structure is designed to support the “green” impact on 4 levels: people, processes, principles and purposes;

- **Level 4:** Strategic ecosystem balancing initiative, green banking activities are not limited to single operations but are expanded into networks, alliances, community dialogues, or ecosystems to achieve the sustainability of social-environmental and financial factors;

- **Level 5:** Proactive ecosystem balancing initiative, in which green banking activities are similar to level 4 but carried out in a proactive, purposeful manner, rather than responding to external changes like strategic initiatives at level 4.

Thus, only at levels 4 and 5, the green banking model is reflected in the bank’s long-term business strategy, meeting both social and environmental standards, ensuring sustainable development and having spillover effects on other economic sectors in the green growth model.

*\* Determinants of Green Bank Adoption in Commercial Banks in Malaysia (2018)*

The study was conducted by Dhamayanthi and Teresa Chirute with a sample of 160 employees, customers and stakeholders from banks in Kuala Lumpur, Malaysia. The study addresses the determinants of green banking adoption in the banking sector in Malaysia. The author used quantitative research methods. At the end of the study, the authors outlined the factors affecting the application of green banking in the banking sector in Malaysia including: (i) Concern for the environment, (ii) Stakeholder pressure, (iii) Supportive policies, (iv) Economic factors, (v) Loan demand.

The author came to the conclusion that adopting green banking is not only about becoming environmentally friendly, but it also brings benefits, such as: minimizing risks as well as costs of banks, contributing to the overall benefits of the environment as well as improving the reputation of banks. Green banks support the bank’s commercial objectives on corporate social responsibility. Finally, it is important for the author to be aware of their responsibility to the environment as well as society and the economy so that they can participate and survive in the global market.

*Study on factors affecting green banking development in Vietnam (2019)*

The study was conducted by Ngo Anh Phuong (and guided by Dr. Tran Thi Thanh Tu). The study surveyed 155 samples. With the research objective: to develop scales, models and assess the impact of factors affecting the development of green banks in Vietnam in the context and actual conditions in Vietnam. The research results will suggest solutions for the government and banks in developing Vietnam’s green bank. Combining qualitative and quantitative methods in research. In particular, qualitative research methods are used to help perfect research scales and models. The author uses the in-depth interview method in qualitative research. The subjects interviewed by the author are 20 experts, managers and employees with extensive experience working in the banking sector in Hanoi and Ho Chi Minh.

The results of quantitative analysis show that the level of green banking development in Vietnam is at level 3. At the same time, through the analysis of factors affecting the development of green banks, there are 04 groups of impact factors including: macro factors (YTVM) have the greatest impact on the development of green banks in Vietnam, followed by the group of financial capacity factors of banks (RE), the group of state support policy factors on green banking development (CSHT) and finally the group of green investment demand factors of business organizations (NCDTX) that have an impact on the development of green banks in Vietnam. For the group of factors, macro factors (YTVM) have the greatest impact on the development of green banks in Vietnam (standardized beta factor of +0.479). For the group of financial capacity factors of banks (RE), there is the second largest impact on the development of green banks in Vietnam (standardized beta factor of + 0.202).

**3. RESEARCH HYPOTHESES AND RESEARCH MODELS**

From domestic and foreign research and combined with the current socio-economic context in Vietnam, the author proposes research hypotheses and research models of factors affecting the implementation of green banking in Vietnam including 5 elements: (i) Pressure from stakeholders, (ii) State support policies, (iii) Potential benefits, (iv) macro factors, (v) green investment needs of enterprises.

STT	Factor	Source
1	Pressure from stakeholders	Dhamayathi (2018)
2	Support Policy	Dhamayathi (2018)
3	Potential benefits	Dhamayathi (2018)
4	Macro factors	Ngo Anh Phuong (2019)
5	Green investment needs of businesses	Ngo Anh Phuong (2019)

**Research hypotheses:**

**H1:** Pressure from stakeholders has a positive impact on the adoption of Green Banking in Vietnam.

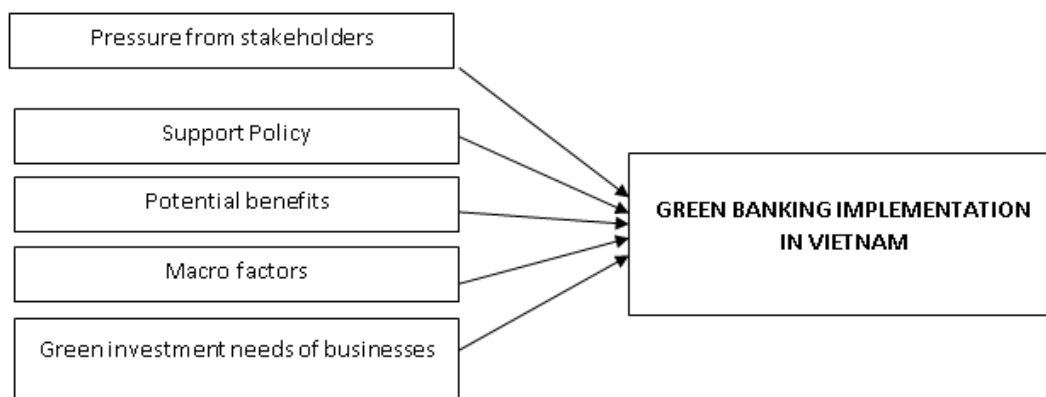
**H2:** The State's support policies have a positive impact on the implementation of green banking in Vietnam.

**H3:** The potential benefits have a positive impact on the implementation of green banking in Vietnam.

**H4:** Macro factors have a positive influence on the implementation of green banking in Vietnam.

**H5:** The demand for green investment of enterprises positively affects the implementation of Green Banks in Vietnam.

Based on the studied models, the author proposes the following research model:



*(Source: Proposed Research Group)*

## 4. RESEARCH METHODOLOGY AND RESEARCH DATA

### 4.1. Research methodology

+ Qualitative research methods:

Research is carried out at the table through documents, books, secondary data, legal documents and the previous researches on green banking and green bank model. Some in-depth interviews with bank leaders are also conducted to gain the personal perspectives on threats and opportunities for Vietnamese banks when launching green banking activities.

+ Quantitative research methods:

*Preliminary research:* Primary data collection using multiple-choice surveys.

The study uses questionnaires consisting of observed variables that are factors affecting green banking implementation in Vietnam. The Likert scale from 1 to 5 is used to measure these variables. From the survey form developed, by conducting a survey of officials and employees working at commercial banks listed on the Ho Chi Minh Stock Exchange. by analyzing the collected data to identify factors affecting the implementation of green banking in Vietnam. The sample selection method used is a non-probability convenient sampling method. The collected data will be processed using SPSS 20.0 software for validation of Cronbach's Alpha scale, EFA analysis, regression.

### 4.2. Research data

The respondents were commercial banks listed on the Ho Chi Minh Stock Exchange. Time range: study the current status of factors affecting the implementation of green banking in Vietnam using primary data collected through questionnaire surveys in the end of 2022. Since then, the study proposes a number

of recommendations to contribute to the development of green banks in Vietnam. Scope of space: Limited scope of research space are the listed commercial banks on the Ho Chi Minh Stock Exchange.

**Table 4. 1 Sample description statistics**

Information		Frequency	Percentage
Education	Intermediate	1	0,5%
	College	19	9,5%
	University	180	90%
Sum			100%
Years of experience in Banking industry	< 1 year	40	20%
	1 – 5 years	98	49%
	> 5 years	61	30,5%
	0	1	0,5%
Sum			100%
Type of bank	Joint Stock Bank	56	28%
	State commercial banks	144	72%
Sum			100%
Uptime of bank	< 5 years	5	2,5%
	5 – 10 years	13	6,5%
	> 10 years	182	91%
			100%

(Source: Data collected)

With 200 votes received, 93 votes were male, 107 votes were female, indicating that women have a greater level of interest in implementing green banking. The survey results showed 122 votes from 20-25 years old, 62 votes from 26-30 years old and 16 votes over 30 years old. The survey recorded 200 employees and specialists at commercial banks, of which the answers received the most from tellers with 24%, 14% were Telesales staff. Besides, there are many other positions such as credit support staff is 13.5%, risk management specialist is 10% and there are some other positions such as product developer, international payment staff, counselor, credit specialist, customer service staff, etc Business support specialists, financial analysts, personal account specialists, internal audit staff. However, a few did not disclose their positions, about 3.7%.

The research team received responses from surveyors working at different commercial banks. Typically, state-owned commercial banks such as Joint Stock Commercial Bank for Investment and Development of Vietnam (BIDV) with 37.5%, followed by answers from employees of Vietnam Joint Stock Commercial Bank for Industry and Trade (Vietinbank) with 28.1%, Joint Stock Commercial Bank for Foreign Trade of Vietnam (Vietcombank), Joint Stock Commercial Bank for Agriculture and Rural Development of Vietnam (Agribank) and some joint stock commercial banks such as Vietnam Technological and Commercial Joint Stock Bank (Techcombank), VP Bank, ACB, MB Bank, and some banks listed on the Ho Chi Minh Stock Exchange.

## 5. RESEARCH RESULTS

*\* Cronbach's Alpha confidence coefficient analysis*

The research team conducted face-to-face survey interviews and distributed online questionnaires designed through google forms of commercial banks listed on the Ho Chi Minh City Stock Exchange. At the end of the survey, the total number of valid responses was 200 votes. The survey is built based on



an overview of research works related to the topic and the actual context of the study, the observed variables are measured using the Likert scale with the following 5 levels of popularity: 1-Strongly disagree; 2-Disagree; 3-Normal; 4-Agree; 5-Totally agree. All valid samples are processed using SPSS software to conduct confidence analysis, correlation analysis, exploratory factor analysis, regression analysis, and hypothesis testing.

The selection of the observed variable and scale when the observed variables have a total variable correlation coefficient greater than 0.3 and Cronbach's Alpha coefficient greater than 0.6.

Cronbach's Alpha confidence coefficient results of the scales for each factor group are presented in the following table:

**Table 5.1 Summary of Cronbach's Alpha coefficients of scales**

STT	Observation variables	Item-total correlation
A. Stakeholder pressure (PRE) Cronbach's Alpha =, 0.914		
1	PRE1	0,769
2	PRE2	0,858
3	PRE3	0,891
4	PRE4	0,858
5	PRE5	0,565
6	PRE6	0,636
B. Support Policy (POL) Cronbach's Alpha coefficient: 0.930		
1	POL1	0,871
2	POL2	0,880
3	POL3	0,811
4	POL4	0,883
5	POL5	0,696
6	POL6	0,789
7	POL7	0,559
C. Potential Benefits (BEN) Cronbach's Alpha coefficient: 0.826		
1	BEN1	0,687
2	BEN2	0,646
3	BEN3	0,720
4	BEN4	0,059
5	BEN5	0,800
6	BEN6	0,729
D. Macro factors (MAC) Cronbach's Alpha coefficient: 0.891		
1	MAC1	0,732
2	MAC2	0,660
3	MAC3	0,622
4	MAC4	0,648
5	MAC5	0,687
6	MAC6	0,722
7	MAC7	0,744
E. Corporate Green Investment Needs (DEM) Cronbach's Alpha coefficient: 0.726		

1	DEM1	0,647
2	DEM2	0,539
3	DEM3	0,538
4	DEM4	0,592
5	DEM5	0,623
6	DEM6	0,049

(Source: Results extracted from SPSS)

*\* EFA Discovery Factor Analysis*

EFA factor analysis gives an independent variable with a loading factor of 0.5 that results in a factor rotation matrix table that examines the relationships between all variables in all different groups of factors in order to detect observed variables that upload multiple factors or observed variables that are different.

KMO and Bartlett’s test: The KMO coefficient = 0.644 is greater than 0.5 so factor analysis is appropriate with practical significance, Sig. (Bartlett’s Test) = 0.000 proves that the observed variables are correlated in the population, Eigenvalues >1 represents the variation explained by each factor that affirms the factor drawn to summarize the information best. A total extract variance of 61.367% (greater than 50%) indicates that EFA analysis is appropriate, according to Gerbing & Anderson (1998).

In order to identify, measure and assess the impact of 5 groups of factors on the implementation of green banks at commercial banks listed on the Ho Chi Minh Stock Exchange, the authors conducted multivariate regression model analysis and examined the indicators.

**Table 5.2. Rotating matrix table**

Rotated Component Matrix <sup>a</sup>					
	Component				
	1	2	3	4	5
POL1	,886				
POL4	,873				
POL2	,871				
POL3	,832				
POL6	,761				
POL5	,702				
POL7	,582				
MAC7		,812			
MAC1		,809			
MAC6		,775			
MAC5		,773			
MAC4		,732			
MAC2		,727			
MAC3		,706			
PRE3			,878		
PRE4			,875		
PRE2			,861		

PRE1			,743		
PRE6			,628		
PRE5			,534		
BEN6				,881	
BEN3				,859	
BEN5				,735	
BEN1				,693	
BEN2				,644	
DEM5					,814
DEM1					,780
DEM4					,757
DEM3					,683
DEM2					,662
Extraction Method: Principal Component Analysis.					
Rotation Method: Varimax with Kaiser Normalization.					
a. Rotation converged in 6 iterations.					

(Source: Results extracted from SPSS)

- R Square calibration: The corrected R square model result = 0.615 greater than 0.5 indicates that the model is good.

- The Sig. index of the F test determines the suitability of the regression model. The model results show that Sig = 0.000 (greater than 0.05), so the study's model is completely consistent.

#### \* Regression analysis

The multivariate linear regression equation is written from the results of the Table above as follows:

**Green bank implementation = const +  $\beta_1$ \*Stakeholder pressure (PRE) +  $\beta_2$ \*Support policy (POL) +  $\beta_3$ \*Potential benefits (BEN) +  $\beta_4$ \*Macro factors (MAC).**

Each relationship between the green bank implementation dependent variable and the independent variables is shown in the following normalized regression equation:

**Green Bank Implementation = 1.026 + 0.419\*Stakeholder Pressure (PRE) + 0.190\*Support Policy (POL) + 0.184\*Potential Benefit (BEN) + 0.093\*Macro Factor (MAC).**

The regression equation shows that the implementation of green banking at commercial banks listed on the Ho Chi Minh City Stock Exchange is influenced by four groups of factors: Pressure from stakeholders, Support policies, Potential benefits, Macro factors; reject the factor The need for green investment of enterprises. The degree of impact of each group of factors on customers' decision to accept and use services is different while other factors remain constant. The regression coefficients all bear the sign (+) representing independent variables that are positively related to the dependent variable. Comparing the impact of these 04 variables on the dependent variable Green banking implementation in Vietnam in descending order is as follows:

The Pressure from Stakeholders (PRE) factor group had the strongest impact ( $\beta = 0.419$ ), followed by the Supporting Policy factor group (POL) ( $\beta = 0.190$ ), the Potential Benefit factor group (BEN) ( $\beta = 0.184$ ) and the lowest was the macro factor (MAC). At the same time, the Beta > 0 coefficients show that

the independent variables act in the opposite direction with the dependent variable. This means that any one factor will make the deployment of green banking at commercial banks increase. Therefore, the hypotheses H1, H2, H4, H5 stated in the research model are accepted.

Model conformity assessment and verification: The regression results have corrected R2 and R2 values of 0.644 and 0.615, respectively, indicating a relatively high model suitability with 95% confidence. In other words, the independent variables of the model explain about 60% of the variability of dependent variables or 60% of green banking deployments at commercial banks listed on the Ho Chi Minh City Stock Exchange influenced by the above 4 groups of factors. The Durbin-Watson coefficient = 2.013, (in the range 1 – 3), demonstrates that there is no first-order sequence correlation in the model; test F has a value Sig.= 0.000 (< 0.05), so the model used is appropriate; the Tolerance coefficients > 0.0001 so all variables meet acceptance standards. The variance magnification coefficients VIF < 10 should have no linear multi-addition. The Sig. coefficient of 5 independent variables is all < 0.05, so 4 of the 5 independent variables are received.

**Table 5.3 Results of regression analysis**

Model	Unstandardized beta	Standad deviatin	Normalized Beta	T	Sig.	Error	VIF
System. number	1,026	0.241		4,254	0.000		
PRE	0.409	0.070	0.419	5,880	0.000	0.596	1,679
POL	0.162	0.052	0.190	3,093	0.000	0.799	1,252
BEN	0.161	0.059	0.184	2,706	0.000	0.653	1,531
MAC	0.064	0.053	0.093	1,203	0.000	0.505	1,679
DEM	0.066	0.072	0.079	,919	0.359	0.407	2,458

(Source: Results extracted from SPSS software)

## 6. EXCHANGES AND RECOMMENDATIONS

### \* *Government*

The Government needs to complete a stable legal policy framework, appropriate policies on taxes, fees and charges to support banks in providing green products and services on the one hand; On the other hand, encourage businesses to invest in environmentally friendly projects. Moreover, the Government and the State Bank of Vietnam need to cooperate with international organizations as well as experienced countries to develop common environmental policies to help commercial banks have a basis to gradually become more environmentally friendly, facilitating the emergence of green banks in Vietnam. In addition, the Government should include banking development goals in the national strategy on green growth.

### \* *State Bank of Vietnam (SBV)*

The research results show that pressure from stakeholders has a great impact on the implementation of commercial banks at commercial banks, so the SBV needs to make requirements on the deployment of green banks at commercial banks.

According to the research results, the State Bank raised the awareness of banks in spreading the implementation of green banking in other industries or fields. Training should be organized to strengthen the capacity of commercial banks and financial institutions in financial activities - green credit. The State Bank needs to raise the awareness of commercial banks about green banking, starting with raising the awareness of managers and senior leaders of banks so that they can plan accordingly. detailed and specific plans to establish green development strategies at each level suitable for each bank. In addition, as the

operating center of the banking system, the State Bank needs to issue specific policies and regulations to guide commercial banks to fulfill their responsibilities for environmental protection, especially through the implementation of green banking activities.

Support policies also make a very important contribution to the implementation of green banking, so the State Bank should have policies to support the development of green banking services, giving specific lists of areas, industries that need to be prioritized for support as well as limited in the green banking development strategy for commercial banks to refer to and serve as a basis in the credit granting process for projects; at the same time, there should be sanctions for commercial banks that provide credit for projects that have serious impacts on the environment and society. Actively apply technologies of the Fourth Industrial Revolution (Industry 4.0) in the innovation orientation of the banking industry. Continue to promote innovation and application of modern technologies by strengthening the integration of information technology in the state management of the State Bank of Vietnam.

Besides, in order to successfully implement the Green Banking Development Project towards sustainable development, it is necessary to mobilize the resources of the whole society. In particular, the banking industry is responsible for actively supporting the economic transition towards green growth and sustainable growth through the mechanism of mobilizing and providing capital for environmental protection projects. . There should be policies to support the application of technology in banks to evaluate green investments/projects.

*\* Commercial banks*

Commercial banks should consider green banking as a development strategy for their entire operations. Because green banking not only brings benefits such as avoiding paper-intensive procedures and using online transactions such as SMS, ATM... Paperless banking helps control deforestation but also benefits tax, the implementation of green banking helps to reduce costs, thereby reducing payable taxes.

Commercial banks will have to invest in a management system, create awareness for entrepreneurs about environmental and social responsibility, and help them carry out environmentally friendly business activities. Promote the application of Industry 4.0 technologies to service development, information data management to help limit human resources and infrastructure investment, help eliminate paper waste, save fuel, and reduce waste. printing costs, reducing carbon emissions. Actively propagate to the bank's customers about the benefits of green credit. In addition to businesses, the bank's customers are the bridge that brings green credit to the economy through its green investment activities. It is necessary to focus on building a strategic framework for green banking depending on its business orientation, market segments, products and target customers, and its capabilities and strengths; develop a strategic framework and roadmap towards green banking development at an appropriate level. It is necessary to develop and establish a comprehensive environmental and social risk management system; follow guidelines on environmental and social risk assessment, incorporating environmental risk assessment as part of the bank's credit risk assessment. It is necessary to establish a unit/department responsible for the implementation of environmental and social risk management.

**Conclusion**

Vietnam has identified "green growth" as an important content of sustainable development, ensuring fast and effective economic development and making an important contribution to the implementation of the National Strategy on climate change. Thus, the implementation of green banking is one of many steps to realize the development of a green economy, a sustainable economy. The State Bank and the Government

need to come up with reasonable policies to promote the implementation of Green Banking in banks across the country. Before the advantages, difficulties and barriers in the process of implementing and developing green banking, banks need to continue to promote their strengths and positive points, inherit the achieved achievements as well as consider, overcome the limitations to build and develop the green banking sector in particular and the sustainable Vietnamese economy in general. To build a civilized, rich, beautiful, prosperous and sustainable society.

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## FACTORS AFFECTING THE ONLINE LIFE INSURANCE PURCHASING INTENTION OF PEOPLE IN HANOI

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**Abstract:** *The article uses the Technology Use and Acceptance Model - UTAUT as a theoretical basis to study the factors affecting the online life insurance purchasing intention of people in Hanoi. Data was collected by conducting a survey of 480 observational samples in the form of an online survey via Google Forms. After removing 30 unreliable votes, 450 valid votes were obtained, 93.75% effective withdrawal rate. Data analysis was performed with the use of SPSS20 software. Descriptive statistical techniques, scale testing, exploratory factor analysis, multivariable linear regression with 6 factors divided into 27 observed variables. The results show that 3 factors including Social influence, Perceived usefulness, and Facilitating conditions all have a positive impact on the intention to buy online life insurance of people in Hanoi. Accordingly, the article proposed practical recommendations for businesses providing online life insurance services in Vietnam and state management agencies to develop this market.*

**Key words:** *Life insurance, online life insurance, UTAUT.*

### 1. INTRODUCTION

The 20th century was marked by the explosion of scientific and technological revolutions, the first of which was the explosion and penetration of information technology (IT). That is having a strong, profound, and comprehensive impact on all areas of socio-economic life, including the insurance sector. Technology is gradually changing the face of the insurance industry in a more positive and modern direction, creating convenience for users. Theoretically, buying and selling online insurance services is a method of product distribution formed in the environment of modern technology application, and also a transaction method that customers can choose based on their feelings and evaluation which is different from traditional methods of communication transactions. In practical terms, after the COVID-19 pandemic, the habit of purchasing insurance through direct contact has changed and the online insurance purchasing is tending to expand and develop. In Vietnam, insurance companies are also increasing the application of technology to diversify methods of reaching customers and distributing products, while enhancing the customer experience through online insurance products. According to a report by the Vietnam Insurance Supervision and Administration Department, up to now, there are 19 life insurance companies and 30 non-life insurance companies in Hanoi. To optimally increase sales and expand market share, insurance companies have started to offer online insurance services, which reduces transaction costs and increases the sales volume. However, life insurance products have their characteristics, so not all companies are ready to enter this playing field. In Vietnam, there are currently 10 online life insurance companies, including Bao Viet, Prudential, Manulife, AIA, FWD, Chubb Life, Dai-ichi Life, Generali, Hanwha Life and PVI. In particular, IBAOHIEM, the predecessor of the company is Bao Viet Online Insurance Sales Department, is still the leading unit in this field with cooperation with 20 original insurance companies spread across the country. Like most other companies, Prudential, one

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of the major insurance companies, invested in the development of the PRUOnline customer portal, the PruBot utility application, and its website to serve customers to buy online insurance. In addition, FWD and Manulife chose to confront each other on two major e-commerce platforms, Shopee and Tiki. Thus, it is undeniable that online channels are clear and growing trends. However, customers' intention to buy online life insurance depends on many factors such as Perceived usefulness, Perceived ease of use, Trust, Perceived risk, Social influence and Facilitating conditions. Therefore, building a model to measure and evaluate the influence of factors on customers' intention to buy online life insurance in Hanoi is an urgent issue for companies that have been providing services. Because, finding the answer to the above problem not only contributes to affirming an insurance product distribution method that adapts to the 4.0 technology era, but also helps insurance companies and managers to can improve business performance and develop the insurance market.

## **2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK**

### **2.1. Literature review**

In the current digital technology era, the Internet opens up many potential markets for businesses, as well as useful and convenient products for consumers (Chiang Liu, 2016). There is a new and promising market like online life insurance. However, many consumers are not really interested in online transactions because they feel insecure, difficult to control and use.

Gebert-Persson, Sabine et al. (2019) carried out research called "Online insurance claims: when more than trust matters." The results of previous research on financial services suggested that Trust is always greater or equal to Perceived usefulness and Perceived ease of use in forming Attitudes towards acceptance of online insurance. The difference of this study is that it shows that the Trust attitude factor is only somewhat significant, the relationship is less binding between Trust and Intention to use online services. Meanwhile, the aspect of attitude towards technology including to Perceived usefulness and Perceived ease of use has a strong influence on intention to use online shopping.

Research by Huang, Wen-Shin, Chia-Tse Chang, and Wei Yeng Sia (2019) suggested that for relatively complex insurance products such as life insurance, Trust has the most positive impact; Perceived usefulness and Product engagement both had a significant positive effect on Attitude; Perceived risk has a significant negative impact on Attitudes; Attitudes and subjective norms have a significant positive impact on people's Intention to buy online insurance. As such, high-priced and long-term insurance may not be suitable for buying online because purchase intention relies too much on people's trust.

To find out the main factors affecting the intention to purchase online life insurance of Chinese customers, Jiang, Shi-jie et al. (2019) used a proposed theoretical model including the acceptance and using technology (UTAUT) combined with 2 external factors: Trust and Perceived risk. Data were collected from a field survey questionnaire with a sample size of 315 observations. The results show that customers' intention to buy online life insurance is significantly influenced by Performance Expectancy, Effort Expectancy and especially Social influence has the largest positive impact. In addition, Trust plays the role of both a fairly large direct positive factor affecting the intention to purchase online life insurance, and an indirect factor affecting through Perceived risk.

Nguyen Thanh Huyen et al. (2019) conducted a survey on customers' demand for online insurance and at the same time found out the factors that affect customers' intention and behavior to use online insurance services through a contract model UTAUT. Research results, Effort Expectancy and Facilitating Conditions do not influence the intention to use online insurance. This problem can be explained because customers mainly consider the benefits and risks of using the service rather than the way to buy the product on the



computer or phone. In addition, the research results also showed that Trust has an impact on Perceived risk, Performance Expectancy, Effort Expectancy.

Research by Nguyen Bich Ngoc et al. (2022) focused on understanding the factors affecting the acceptance of technology in online purchase of life insurance by customers, thereby proposing practical solutions for Vietnamese insurers. The results showed that when people have confidence in technology in online insurance, their intention to buy insurance will be positively affected. The benefits of technology and the way technology is used in online insurance will increase people's attitude toward accessing and buying insurance products through online channels. In terms of Attitude, if customers find online shopping to be trustworthy, it will increase their likelihood of accepting a purchase.

## **2.2. Theoretical framework**

### **2.2.1. Online insurance**

Online insurance is a convenient service as well as a new trend in the digital economy 4.0. According to Aarabi & Bromideh (2006), online insurance is the use of the Internet and IT in the development, distribution, and sale of insurance services. More specifically, online insurance is a method of signing insurance contracts by online channels. The use of the Internet ensures a better and more cost-effective transmission of information over a large area. It changed the role of insurance agents or brokers from an "insurance intermediary" to a "transmitter" for clients (Arora, 2003). Accordingly, customers don't need to go to the nearest insurance branch to buy or renew insurance packages; There is also no need to contact a local agent to purchase insurance policies on behalf of the customer. With online insurance, users can flexibly choose the product package that suits their needs without spending too much time and effort.

### **2.2.2. Factors affecting the intention to participate in online life insurance**

#### **Perceived usefulness**

Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989). Thus, Perceived usefulness in the article refers to the extent to which customers perceive that they will benefit when participating in online life insurance. The usefulness of technology has a key influence on consumer intention. If online consumers believe that this system will have a positive impact on their online shopping experience, then the intention to use this system will increase (Maher Taib Toukabri, 2021).

#### **Perceived ease of use**

According to Davis et al. (1989), Perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free from effort." Ease of use includes both ease of learning and ease of use. This factor is related to the adoption of a system because an easy-to-use system requires less effort by the user, thus allowing them to allocate more resources to other activities, since that force is a finite resource (Radner & Rothschild, 1975). Perceptions will vary depending on the user's knowledge or previous experience with similar systems. Finally, Perceived ease of use can change over time. As users become more proficient in using a system, they may begin to find it increasingly easy to use.

#### **Trust**

Trust means "The willingness of an exchange partner to make oneself vulnerable to the actions of another party, in the expectation that the other party will perform a particular action" (Mayer et al., 1995). Trust is very important in the online environment, behavioral intentions as well as customer satisfaction are determined by security features (Meuter, et al., 2000). For insurances with high costs and relatively

complex policies such as life insurance, the belief factor has the greatest impact on attitude, while attitude positively affects the intention to participate in online life insurance (Huang & et al., 2019).

**Perceived risk**

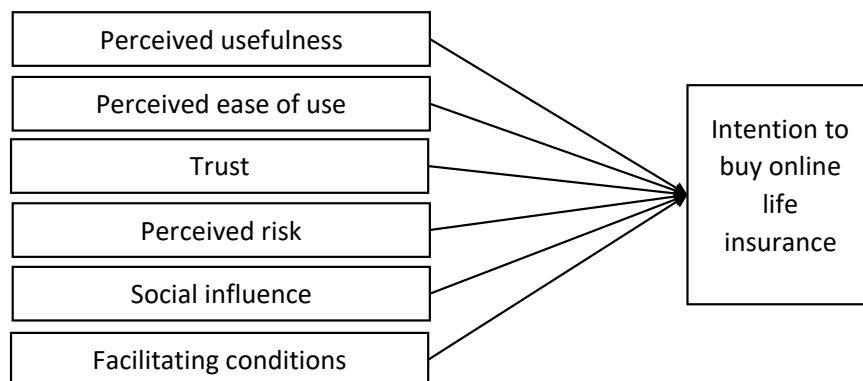
Perceived risk in this case refers to potential losses that users feel when participating in online life insurance. Featherman and Pavlou (2003) studied consumer acceptance of e-services from the perspective of Perceived risk. Research results have demonstrated that economic risk, functional risk, psychological risk, social risk, privacy risk, and time risk are the six dimensions that affect the using internet. Security risk is the privacy and safety policy of products and services, and discomfort or uncertainty about the use of a particular technology (Joshi & Bhatt). The risks associated with the e-commerce market mainly stem from the level of uncertainty regarding product performance, service delivery quality, privacy protection and technical difficulties encountered in purchasing process (Forsythe & Shi, 2003). At the same time, when Trust increases, Perceived risk decreases and risk perception has a negative impact on intention to use online banking (Nguyen Thanh Huyen & et al., 2019).

**Social influence**

Social influence is understood as “The degree to which an individual perceives that important others believe he or she should use the new system” (Venkatesh et al., 2003). Through the UTAUT model, Venkatesh has stated that social influence can have an impact on users’ intention to use technology. Social influence can originate from many different aspects such as family members, friends, partners or influence from celebrities, public figures, etc. This factor plays a role of motivating consumers to share views and insights about their service experience. According to Nielsen (2015), in 92% of purchases, consumers make decisions based on recommendations they receive from friends and acquaintances rather than other sources. This is especially important in the online context.

**Facilitating conditions**

Facilitating conditions is “The degree to which an individual believes that an organisations and technical infrastructure exist to support use of the system” (Venkatesh et al., 2003). Giao et al (2020) argue that the Facilitating conditions is the availability of resources such as documents or technology infrastructure that can assist in the use of new technology. When there are favorable conditions such as finance, equipment, knowledge, etc., consumers will be more likely to intend to participate in online life insurance.



**3. METHODOLOGY AND DATA**

**Research model**

The research model is built based on the Technology Use and Acceptance Model - UTAUT. On the basis of reference and inheritance of research by Huang & et al. (2019), the research model is added with

two additional factors: Trust and Perceived risk. Because Trust is a factor that has a strong direct positive impact on users' intention to buy online life insurance (Jiang, Shi-jie & et al., 2019); economic risks, functional risks, psychological risks, social risks, privacy risks and timing risks that affect consumers' use of internet services (Featherman, Mauricio S. , and Paul A. Pavlou, 2003). Besides, Davis (1989) assessed the Perceived usefulness to be similar to the Performance Expectancy of the UTAUT model. Meanwhile, Perceived usefulness is a familiar and convenient term for surveying. Therefore, the research uses Perceived usefulness instead of Performance Expectancy. Similarly, Effort Expectancy is replaced by Perceived ease of use in the Technology Acceptance Model - TAM. The research model is described as follows:

### **Hypotheses**

According to Gebert-Persson et al (2019), usefulness has a strong influence on the intention to use online insurance. Furthermore, Davis et al. (1989) and Quan et al (2021) all show that the perception of usefulness is a fundamental factor determining the intention behavior of users to use online payment methods in making purchases, such as payment by e-banking or e-wallets. Therefore, the following hypothesis is proposed:

*H1: Perceived usefulness has a positive impact on the intention to buy online life insurance of people in Hanoi.*

In his research, Dr. V. Uma Maheswari et al (2018) demonstrated that perceived ease of use is one of the two factors that have the greatest impact on users' intention to buy online life insurance. The easier the online life insurance service is to use, the higher the chances for customers to accept and purchase it. This is also supported by the majority of related studies. Therefore, the following hypothesis is proposed:

*H2: Perceived ease of use has a positive impact on the intention to buy online life insurance of people in Hanoi.*

According to the results of Jarvepaa and Tractinsky, consumer intention behavior can be influenced by beliefs in uncertain situations such as e-commerce on the Internet. For insurances with high prices and relatively complicated policies such as life insurance, the trust factor has the greatest impact on attitudes, and attitudes, in turn, have a positive impact on the intention to buy online life insurance (Huang & et al., 2019). Therefore, the following hypothesis is proposed:

*H3: Trust has a positive impact on the intention to buy online life insurance of people in Hanoi.*

Perceived risk is an important determinant of consumers' willingness to accept online banking services (Li & Bai, 2010). When studying the intention to take up insurance online of people in the Gujarat region, Parina Patel & Shivam Thakar (2022) showed that Perceived risk had a negative impact on online insurance acceptance. Therefore, the following hypothesis is proposed:

*H4: Perceived risk has a negative impact on the intention to buy online life insurance of people in Hanoi.*

Zhou et al (2010) examined the influence of social influence on users' adoption of mobile banking in China. The results show a positive effect of social influence on user's behavioral intention. The results are similar to the study of Nguyen Thanh Huyen & colleagues (2019) when considering the intention to buy online insurance of Vietnamese users. Therefore, the following hypothesis is proposed:

*H5: Social influence has a positive impact on the intention to buy online life insurance of people in Hanoi.*

Studies by Ajzen (1991), and Pushpa A et al. (2017) showed that favorable conditions have a direct influence on behavioral intention. When there are favorable conditions such as finance, equipment,

knowledge, etc., consumers will be more likely to intend to buy online life insurance. Given these considerations, the following hypothesis is proposed:

*H6: Favorable conditions have a positive impact on the intention to buy online life insurance of people in Hanoi.*

**Variable and Description**

All the items in the questionnaire were rated on a 5-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The scale or components measuring factors affecting people’s intention to buy online life insurance in Hanoi include the following variables:

**Table 1: Variable description**

Factor	Codes	Variable type	Description
Perceived usefulness	PU1	Independent	Purchasing online life insurance saves time
	PU2	Independent	Purchasing online life insurance saves travel costs
	PU3	Independent	It is possible to buy online life insurance anywhere
	PU4	Independent	Easy to compare and choose online life insurance products
Perceived ease of use	EU1	Independent	User-friendly online life insurance selling website interface
	EU2	Independent	Easily learn how to use an online life insurance selling website
	EU3	Independent	Easily query information
	EU4	Independent	The process of purchasing online life insurance is simple, clear and easy to understand
Trust	TR1	Independent	I believe online life insurance meets my expectations
	TR2	Independent	I believe that the information on online life insurance products is complete and accurate
	TR3	Independent	I believe that an online life insurance provider is always in the best interests of the customer
	TR4	Independent	I believe the website that sells online life insurance is trustworthy
Perceived risk	PR1	Independent	I am concerned that the online life insurance website collects too much of my personal information
	PR2	Independent	I am concerned that the online life insurance website will misuse my personal information
	PR3	Independent	I am concerned that my personal information is not secure on the sales site
	PR4	Independent	I am concerned that the payment may go wrong
Social influence	SI1	Independent	Most people around me take online life insurance
	SI2	Independent	Does the media affect my intention to buy online life insurance
	SI3	Independent	Does family influence my intention to buy online life insurance
	SI4	Independent	Friends influence my intention to buy online life insurance
	SI5	Independent	Colleagues influence my to buy online life insurance
Facilitating conditions	FC1	Independent	I have the funds and equipment to buy online life insurance
	FC2	Independent	I believe I have enough knowledge to buy online life insurance
	FC3	Independent	I will always find help if I have problems or questions during the process of buying online life insurance
Intention to buy online life insurance	IB1	Dependent	I intend to buy online life insurance when given the opportunity
	IB2	Dependent	I will likely to buy online life insurance in the near future
	IB3	Dependent	I will recommend my relatives to buy online life insurance

## Data

This study uses primary data sources through a survey of 480 observed samples distributed in 12 urban districts of Hanoi with 240 samples and 1 town, 17 suburban districts of Hanoi with 240 samples from November 2022 to January 2023. However, during the actual investigation, the authors only obtained 450 valid votes. Survey subjects are people aged 18 years or older, studying or living in Hanoi, have bought or intend to buy online life insurance. The survey sample was formed according to the convenient sampling method to collect information.

The data collection method used is a combination of face-to-face and online voting. Collected data are processed by SPSS20 with applied techniques including descriptive statistics of the survey sample, testing the reliability of the scale, exploratory factor analysis, correlation analysis and regression analysis using the OLS method.

## 4. RESULTS AND DISCUSSION

### 4.1. Descriptive Statistics

**Table 2. Sample Descriptive Statistic**

Description	Groups	Sample size N=450	
		Frequency	%
Gender	Males	175	38,9%
	Females	275	61,1%
Age	18 to 25 years old	92	20,4%
	26 to 35 years old	235	52,2%
	36 to 50 years old	81	18,0%
	over 50 years old	42	9,3%
Academic level	Lower than bachelor's degree	70	15,6%
	Bachelor's degree	336	74,7%
	Master's or higher degree	44	9,8%
Income (per month)	Below 10 million VND	95	21,1%
	10 to 20 million VND	229	50,9%
	20 to 30 million VND	108	24,0%
	over 30 million VND	18	4,0%
Status of taking online life insurance	Have been and are buying	118	26,2%
	have not bought yet	332	73,8%

Source: Calculations of the research team

According to the results of a random survey of 450 observations, the female response rate accounted for 61.1%, and the male response rate was 38.9%. The survey subjects were mainly from 26 to 35 years old, accounting for 52.2%, from 18-25 years old accounted for 20.4%, followed by the age group from 36-50 years old, accounting for 18.0% and finally over the age of 50 with the rate of 9.3%. The above figures show that most respondents to the survey are young people. Most of the respondents have bachelor's degree,

accounting for 74.7%, the rest are lower than bachelor’s degree (accounting for 15.6%) and master’s or higher degree (accounting for 9.8%). According to the survey results, more than half of the respondents have an average income of 10-20 million per month, accounting for 50.9%. The group of customers with incomes from 20-30 million and below 10 million have 24.0% and 21.1% respectively. The group of customers with incomes over 30 million per month accounted for the lowest proportion of 4%. According to statistics, the survey results on the status of buying online life insurance show that the majority of respondents have not purchased life insurance online (accounting for 73.8%). Meanwhile, the number of respondents who have purchased online life insurance only accounted for 26.2%.

**Table 3. Descriptive statistics of variables**

	<b>N</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std.Deviation</b>
PU1	450	1	5	4.56	.763
PU2	450	1	5	4.59	.733
PU3	450	1	5	4.56	.791
PU4	450	1	5	4.42	.825
EU1	450	2	5	4.25	.865
EU2	450	2	5	3.96	.790
EU3	450	2	5	3.91	.812
EU4	450	2	5	3.94	.822
TR1	450	1	5	3.64	.978
TR2	450	1	5	3.45	1.046
TR3	450	1	5	3.46	1.001
TR4	450	1	5	3.70	.940
PR1	450	1	5	3.34	1.006
PR2	450	1	5	3.29	.931
PR3	450	1	5	3.40	.949
PR4	450	1	5	2.92	.805
SI1	450	1	5	3.71	1.049
SI2	450	1	5	3.65	1.053
SI3	450	1	5	3.39	1.134
SI4	450	1	5	3.41	1.112
SI5	450	1	5	3.32	1.088
FC1	450	1	5	3.82	.924
FC2	450	2	5	3.90	.800
FC3	450	1	5	3.82	.840
IB1	450	1	5	4.10	.919
IB2	450	1	5	3.93	1.027
IB3	450	1	5	3.91	1.080

Source: Calculations of the research team based on SPSS software

The results of descriptive statistics show that the observed variables of Perceived risk and Social influence have an average value of over 3.0 with a rather small standard deviation, around 1%. This means that respondents about online life insurance services rate these factors at an average level. Similarly, the observed variables of Trust, Facilitating conditions and Intent to buy online life insurance have a mean value of over

3.7 with a standard deviation of less than 1%. This means that respondents about online life insurance services rate these factors above average. The observed variables Perceived usefulness and Perceived ease of use had the average value above 4.0 with standard deviation less than 1%. This shows that respondents about online life insurance services surveyed rated the usefulness and ease of use at a good level.

#### 4.2. Cronbach's alpha analysis

**Table 4. Reliability Statistics**

Scale	Cronbanh's Alpha
Perceived usefulness	0,901
Perceived ease of use	0,679
Trust	0,860
Perceived risk	0,834
Social influence	0,802
Facilitating conditions	0,791
Intention to buy online life insurance	0,831

Source: Calculations of the research team based on SPSS software

All the Cronbach's Alpha values of the scales in the research model are greater than 0.6. Therefore, all observed variables are accepted and will be used in the next factor analysis.

#### 4.3. Exploratory factor analysis (EFA)

\* Exploratory factor analysis for independent variables:

**Table 5. KMO and Bartlett's Test for independent variables**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,853
Bartlett's Test of Sphericity	Approx. Chi-Square	4809,086
	df	276
	Sig.	.000

Source: Calculations of the research team based on SPSS software

With the coefficient KMO = 0.853 (> 0.5), it can be confirmed that the factor analysis for the independent variables is appropriate. The sig value. = 0.000 < 0.5 in Bartlett's test means that there is a basis to reject the hypothesis  $H_0$  that the independent variables are not correlated with each other in the population.

**Table 6. Total variance explained for independent variables**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.986	24.942	24.942	5.986	24.942	24.942	3.230	13.460	13.460
2	2.915	12.147	37.089	2.915	12.147	37.089	3.046	12.693	26.153
3	2.610	10.876	47.965	2.610	10.876	47.965	2.702	11.257	37.410
4	1.893	7.889	55.854	1.893	7.889	55.854	2.699	11.244	48.654
5	1.401	5.838	61.692	1.401	5.838	61.692	2.240	9.333	57.988
6	1.182	4.924	66.616	1.182	4.924	66.616	2.071	8.629	66.616
7	.810	3.375	69.991						

8	.794	3.308	73.299						
9	.605	2.520	75.819						
10	.572	2.383	78.202						
11	.546	2.277	80.478						
12	.523	2.177	82.656						
13	.481	2.004	84.660						
14	.473	1.970	86.630						
15	.438	1.826	88.456						
16	.405	1.686	90.142						
17	.367	1.531	91.672						
18	.357	1.487	93.159						
19	.347	1.445	94.605						
20	.315	1.314	95.919						
21	.277	1.152	97.071						
22	.266	1.106	98.177						
23	.252	1.051	99.228						
24	.185	.772	100.000						

Source: Calculations of the research team based on SPSS software

Eigenvalues = 1,182 > 1 represents the variation explained by each factor, then the factor extracted is the best summary of information. Total variance extracted is 66.616% > 50% meets the requirements. This indicates that 66.616% of the variability of the data is explained by 6 factors.

**Table 7. Rotated component matrix for independent variables**

	Component					
	1	2	3	4	5	6
PU2	0,886					
PU1	0,872					
PU3	0,863					
PU4	0,798					
TR2		0,820				
TR3		0,793				
TR1		0,723				
TR4		0,651				
SI5		0,500				
PR1			0,846			
PR2			0,827			
PR3			0,812			
PR4			0,762			
SI2				0,860		
SI1				0,823		



SI3				0,697		
SI4				0,516		
FC1					0,795	
FC2					0,784	
FC3					0,742	
EU4						0,762
EU1						0,696
EU3						0,688
EU2						0,650

Source: Calculations of the research team based on SPSS software

The final rotation matrix results show that there are 24 observed variables grouped into 6 factors . The factor loading coefficients of 24 observed variables are all greater than 0.5 and there is no case that any variable uploads both factors at the same time with the loading coefficients close to each other, showing a correlation. The high correlation between the observed variable and the factor or the variation in the observed variable is mainly explained by the factor.

From the results of EFA analysis, it can also be seen that there is a change in the position of the observed variable SI5. The new group of factors includes TR2, TR3, TR1, TR4, SI5. The group of factors reflects consumers' trust in online life insurance, which can be understood as trust in a specific object, such as trust in e-commerce or trust in an online life insurance provider. Colleagues can influence intention to use insurance online through sharing experiences and product information with each other. If a consumer's co-worker has successfully used online insurance, it will help consumers trust the safety and reliability of the online insurance product, thereby increasing their likelihood of using it. This product also increased. Therefore, the group of factors is still kept the original name as "Trust" and there is no change in the research model.

Six independent factors extracted from EFA factor analysis are kept as original, only changed in number of observed variables as follows: Perceived usefulness factor (PU) includes PU2, PU1 , PU3, PU4; Beliefs (TR) include TR2, TR 3, TR1, TR4, TR5; Perceived risk (PR) includes PR1, PR2, PR3, PR4; Social influence (SI) includes SI2, SI1, SI3, SI4; Facilitation (FC) includes FC1, FC2, FC3, and Ease of Use Perception (EU) includes EU4, EU1, EU3, EU2.

**\* Exploratory factor analysis for dependent variables:**

**Table 8. KMO and Bartlett's Test for dependent variable**

<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</b>		<b>0,725</b>
Bartlett's Test of Sphericity	Approx. Chi-Square	517,301
	df	3
	Sig.	.000

Source: Calculations of the research team based on SPSS software

With the KMO value = 0.725 ( $> 0.5$ ), it can be confirmed that the factor analysis for the dependent variables is appropriate. The sig value. = 0.0000 in the Bartlett test  $< 0.5$  means that there is a basis to reject the hypothesis  $H_0$  that the dependent variables are not correlated with each other in the population.

**Table 9. Total variance explained for dependent variable**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.252	75.071	75.071	2.252	75.071	75.071
2	.388	12.928	87.999			
3	.360	12.001	100.000			

Source: Calculations of the research team based on SPSS software

Eigenvalues = 2,252 > 1 represents the portion of variation explained by each factor, then the derived factor has the best information summary significance. Total variance extracted is 75.071% > 50% is satisfactory. This indicates that 75.071% of the variability of the data is explained by one factor.

**Table 10. Rotation matrix of dependent variable**

	Component
	1
IB1	0,870
IB2	0,870
IB3	0,860

Source: Calculations of the research team based on SPSS software

The results of the factor rotation matrix have extracted 1 factor from 3 observed variables with the cumulative extracted variance of 75.071%, the factor loading coefficients are all greater than 0.5. Therefore, the observed variables of this dependent variable scale meet the requirements for the next correlation analysis.

**4.4. Pearson correlation**

**Table 11. Correlations**

		IB	PU	TR	PR	FC	EU	SI
IB	Pearson Correlation	1	.424**	.469**	.133**	.436**	.007	.602**
	Sig. (2-tailed)		.000	.000	.005	.000	.883	.000
PU	Pearson Correlation	.424**	1	.379**	.074	.295**	.204**	.133**
	Sig. (2-tailed)	.000		.000	.117	.000	.000	.005
TR	Pearson Correlation	.469**	.379**	1	.048	.523**	.194**	.506**
	Sig. (2-tailed)	.000	.000		.314	.000	.000	.000
PR	Pearson Correlation	.133**	.074	.048	1	.141**	.066	.169**
	Sig. (2-tailed)	.005	.117	.314		.003	.165	.000
FC	Pearson Correlation	.436**	.295**	.523**	.141**	1	.154**	.349**
	Sig. (2-tailed)	.000	.000	.000	.003		.001	.000
EU	Pearson Correlation	.007	.204**	.194**	.066	.154**	1	-.038
	Sig. (2-tailed)	.883	.000	.000	.165	.001		.420
SI	Pearson Correlation	.602**	.133**	.506**	.169**	.349**	-.038	1
	Sig. (2-tailed)	.000	.005	.000	.000	.000	.420	

Source: Calculations of the research team based on SPSS software

Based on Pearson correlation coefficient and sig value (Table 11), it shows that the independent variables (PU, TR, PR, FC, SI) are positively correlated with the dependent variable IB with small statistical significance more than 5%. The variable EU was excluded because the significance level of this variable with IB is greater than 0.05, that is, it is not significant in the research model.

#### 4.5. Regression results and discussion

##### \* Model Summary

**Table 12. Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.712 <sup>a</sup>	.507	.501	.61728	2.073

a. Predictors: (Constant), SI, PU, PR, FC, TR

b. Dependent Variable: IB

*Source: Calculations of the research team based on SPSS software*

With the adjusted R square coefficient of 0.501, it shows that the explanatory level of the model is 50.1%. In other words, 5 independent variables in the research model explain 50.1% of the variation of the dependent variable.

##### \* The fit of the regression model

To test the suitability of the overall linear regression model, we use the results of the F test. The F test in the analysis of variance considers whether or not there is a linear relationship between the dependent variable and the whole population set of independent variables.

**Table 13. ANOVA**

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	173.889	5	34.778	91.272	.000 <sup>b</sup>
	Residual	169.179	444	.381		
	Total	343.068	449			

a. Dependent Variable: IB

b. Predictors: (Constant), SI, PU, PR, FC, TR

*Source: Calculations of the research team based on SPSS software*

The results of ANOVA analysis show that the F value is 91,272, which is statistically significant with very small sig. value (Sig. = 0.000 < 0.05). This means that the regression model used in this study is consistent with the actual data collected at the 5% statistical significance level.

##### \* regression results and discussion

**Table 14. Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.437	.248		-1.761	.079		
	PU	.388	.047	.303	8.306	.000	.834	1.199
	TR	.020	.049	.018	.398	.691	.551	1.813
	PR	.004	.039	.003	.092	.927	.952	1.050
	FC	.198	.049	.163	4.085	.000	.696	1.437
	SI	.514	.041	.495	12.522	.000	.709	1.410

a. Dependent Variable: IB

*Source: Calculations of the research team based on SPSS software*

According to the results of the regression analysis, the variance inflation factor (VIF) reached the largest value of 1.813, and all were less than 10. This shows that the variables are independent, there is no closely correlation among variables, so there is no multicollinearity.

The sig. value (p-value) of regression coefficients  $\beta_1$ ,  $\beta_5$ ,  $\beta_6$  are all less than 0.05. This means that 3 independent variables including Social influence, Perceived usefulness and Facilitating conditions all have significant explanatory meanings for the dependent variable Intent to buy online life insurance.

The results of the regression analysis showed that the model explained 50.1% of the influence of the research factors on the intention to buy online life insurance of people in Hanoi. Of the six factors analyzed, three are statistically significant.

Social influence (SI) has a positive effect on Intention to buy online life insurance (IB). This result is similar to the findings of Jiang, Shi-jie et al. (2019). The results also indicate that the Intention to buy online life insurance will be influenced by the people they know around them, such as family members, friends and colleagues. Especially with the ability to impact quickly, strongly and widely, communication has a great role in influencing the behavioral intentions of consumers.

Perceived usefulness (PU) has a positive effect on the Intention to buy online life insurance. This result supports the study results of Gebert-Persson, Sabine et al (2019). This shows that the inherent benefits of online insurance compared to traditional insurance have attracted increasing customer purchases and this trend will continue to grow rapidly in the digital industrial age.

Facilitating conditions (FC) has a positive effect on Intention to buy online life insurance. This result is similar to the research results of Ajzen (1991), Pushpa A et al (2017) when they suggested that favorable conditions have a direct influence on behavioral intention. When there are favorable conditions such as finance, equipment, knowledge, etc., consumers will be more likely to intend to buy online life insurance.

Thus, there are 3 original research hypotheses (H1, H5, H6) that are accepted with statistical significance less than 5%. The Standardized regression equation is written as:

$$IB = 0.495*SI + 0.303*PU + 0.163*FC$$

Based on the regression coefficient, it can be seen that the factor that has the most influence on the Intention to buy online life insurance of people in Hanoi is Social influence, followed by the factor Perceived usefulness and finally the Facilitating conditions.

## 5. CONCLUSIONS AND RECOMMENDATIONS

### 5.1. Conclusion

From the analysis of the above test results, it can be concluded that, there are many factors affecting the Intention to buy online life insurance of people in Hanoi, in which, the study has identified three main influencing factors including: Perceived usefulness, Social influence and Facilitating conditions. All three factors have the same direction influence and explain 50.1% of the change of Intention to buy online life insurance of people in Hanoi. However, influences of these factors are not the same. The factor that has the strongest influence on the Intention to buy online life insurance of people in Hanoi is Social influence, followed by Perceived usefulness, and finally Facilitating conditions. Meanwhile, Perceived ease of use as well as Trust, Perceived risk had no impact on intention to take life insurance online.

### 5.2. Recommendations

#### \* Recommendations for businesses providing online life insurance services

#### *Recommendations are based on the factor “Social influence”*

Through the research results, we can also see that the factor “Social influence” is assessed with an average level ranging from 3.39 to 3.71. This is still a rather low rating, so online life insurance providers

need to take measures to promote positive social impacts and improve people's assessment of this group of factors. The following recommendations should be considered:

- Increase the experience factor for customers through “seeing and hearing”, presenting the benefits of online life insurance with specific examples, from some relatives and acquaintances who have participated and receive payment benefits from online life insurance so that customers feel more convinced, the rate of intention to buy is also higher.

- Develop an effective marketing strategy, quickly update promotional programs on the media with a large number of visitors such as social networks and online newspapers to reach many different potential customers.

- Service providers also need to pay attention to programs such as cross-selling, old customers refer to new customers. Also, invest in promotion programs to attract and develop new customer sources, incentive factors to maintain existing customers.

#### ***Recommendations are based on the factor “Perceived usefulness”***

Most users are interested in the usefulness and convenience that online life insurance brings. The survey results show that the average value of the factor “Perceived usefulness” is at a high level, ranging from 4.42 to 4.59. However, in order to have a long-term strategy to increase the competitiveness of enterprises in this field, enterprises still have to take measures to further enhance the positive effects of usefulness of online life insurance. Therefore, some proposed solutions are as follows:

- Enterprises need to diversify the portfolio of business insurance products, complete and accurate product information for the needs of comparing and selecting products as well as updating the necessary information of customers.

- It is necessary to simplify procedures and automate operations to reduce the time customers participate in insurance.

- Expand transaction links with many partners, especially convenient sites, strengthen links with banks and payment acceptors to help users more conveniently in transactions.

#### ***Recommendations are based on the factor “Facilitating conditions”***

Based on the research results, the average value of the factor “Facilitating conditions” is above average, the lowest is 3.82 and the highest is 3.90. Although this factor has a small impact, it is also one of the factors that positively affects the Intention to buy online life insurance of people in Hanoi. Therefore, creating more favorable conditions for consumers is a necessity for every business providing this service. Suggestions are made as follows:

- Enterprises also need to have a training plan to improve the quality of human resources and professional qualifications of officers and employees, through which the handling of customer requests is done quickly and accurately.

- Online life insurance businesses need to improve their technology infrastructure regularly and have policies to support arising problems in the best way.

- It is necessary to establish and build a database of customer information in order to specifically classify customers to have a suitable working method for each customer group.

#### **\* Recommendations for state management agencies**

- Completing the legal provisions related to online life insurance, building a complete and safe legal corridor for both groups of subjects, which are insurance businesses and customers when participating in online life insurance activities. insurance trading.

- Improving information technology infrastructure is also a necessity. Information technology infrastructure is the connecting highway for the development of online services.

### 5.3. Limitations of the study and future research directions

With the topic “Factors affecting the intention to buy online life insurance of people in Hanoi” there are still certain limitations. Firstly, the study uses convenient sampling methods in Hanoi, so there are limitations on the generalizability of the study. Second, the new research model shows a part of the factors affecting the intention to buy online life insurance. However, besides those factors, there are many other factors that affect the intention to buy online life insurance. Therefore, further studies may use more factors for further testing. Third, the study has not mentioned the actual use of online life insurance. This is also a problem for further research.

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## IMPACT OF FINANCIAL LEVERAGE ON THE FINANCIAL PERFORMANCE OF VIETNAMESE MANUFACTURING LISTED FIRMS DURING THE COVID PERIOD

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**ABSTRACT:** *One of the most important issues of corporate financial management is the financial decision or deciding the level of financial leverage of the enterprise. This study aims to evaluate the impact of financial leverage on financial performance in enterprises in the processing industry in Vietnam. Data were collected from 163 enterprises over a period of 7 years with 1295 observations. Research methods OLS, REM, and FEM were used. The research results show that financial leverage has a negative impact on the financial performance of the business and Covid-19 has a negative impact on financial performance. From there, the study provides management implications to improve the financial performance of the business.*

*Keywords: financial performance, financial leverage, total asset turnover, revenue growth, enterprise*

### 1. INTRODUCTION

Financial efficiency is an economic category, that expresses economic development in depth, reflecting the level of exploitation and use of resources in the process of reproduction, to realize business goals, with spend the least amount of money and get the best results. The essence of financial management efficiency is to reflect the quality of production and business activities, and the level of use of resources to achieve the goal of profit. Financial results not only show the level of production but also help find ways to increase results and reduce costs, to improve the operating efficiency of the business.

Financial leverage measures the extent to which borrowed funds are used to finance the assets of a business with the goal that the income from the assets will be greater than the cost of borrowing. The use of financial leverage is likened to a “double-edged sword”, because, on the one hand, it is a tool to help businesses increase profits for shareholders (Shaked and Plastino, 2012). However, on the other hand, using leverage also creates a fixed debt cost burden, increasing the level of risk for the business. Each business, depending on the characteristics of the industry or different stages of development, will have different leverage strategies. For example, firms with short production and business cycles tend to use a higher proportion of short-term debt. Our businesses that are in the development stage often use more loans to invest in expanding production and business, improving competitiveness and position in the market. In contrast, in periods of economic recession and difficulties, businesses often limit the use of loans to minimize payment risks.

Although there have been many studies on the impact of financial leverage on the financial performance of enterprises, the research results are not consistent and there are no similar studies in the food and beverage industry in Vietnam. Therefore, this study was conducted to add more empirical evidence for this relationship.

In addition to the Introduction, the study includes the contents of the Theoretical Framework, Research Methods, Results and Discussion.

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## **2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW**

### **2.1. Theoretical framework**

#### **2.1.1. Pecking order theory**

The pecking order theory (Myers and Majluf, 1984) suggests that when firms use financing tools, they tend to set priorities for using these sources of funding. More specifically, when there is a need to use capital, businesses will consider all available funding sources and choose the least expensive source of funding (Brealey et al., 2012). The order of precedence suggested by this theory is as follows: first, firms should use internal equity (usually from retained earnings), then debt, and lastly use debt. using capital raised from outside. As a result, high-margin companies often maintain low debt ratios because they tend to use financing that comes from retained earnings. Income from retained earnings is considered a low-cost source of financing while the costs of debt or equity issuance are higher. Thus, according to pecking order theory, the more financially efficient firms are, the lower the leverage ratio will be because it prefers to use retained earnings financing for operations. his motion.

#### **2.1.2. Trade-off theory**

To obtain an optimal debt ratio, a business must trade off the benefits of using debt and the risks of liquidity or bankruptcy if it uses too much debt. When a business borrows, the interest on the loan reduces the taxable income of the business, thereby creating tax savings. However, at the same time, businesses also face fixed funding costs. If the business is not efficient, the income is not enough to cover the debt obligations, and the business easily falls into the situation of insolvency and may lead to bankruptcy. Thus, under the condition that the firm's asset and investment decisions are constant, the firm's optimal debt ratio will be achieved when there is a balance between the benefits of debt and the costs associated with it. loan debt. Also, according to Myers (2001), one of the advantages of the trade-off theory is that it explains why firms do not keep a high debt ratio.

#### **2.1.3. Representative theory**

Another theory often used to explain the relationship between financial leverage and the financial performance of firms is agency theory. In fact, there may be a conflict between the interests of three parties: shareholders – creditors, and corporate managers. Managers will always act in their own interests, which sometimes conflicts with the interests of shareholders. In this case, agency costs will be incurred. Agency costs are the portion of value that a firm loses due to disagreements in the interests of its stakeholders (Jensen & Meckling, 1976). According to this theory, the use of high financial leverage will reduce agency costs, thereby increasing the financial efficiency of the business. This is because increasing the proportion of debt will increase the risk of insolvency and personal losses for managers: such as salary reduction, bonus, or reputation deterioration (Grossman & Hart, 1982). Besides, large debt also puts pressure on managers to use cash flow efficiently to cover interest expenses (Jensen, 1986).

Thus, using financial leverage can help businesses reduce agency costs incurred between managers and shareholders of the enterprise. However, for conflicts between shareholders and creditors of the enterprise, financial leverage increases agency costs, leading to a decrease in the financial performance of the business. Shareholders, because they want to bring the most benefit to themselves, may prefer to invest in riskier projects to earn high returns. However, this is not preferred by creditors because these projects can increase the creditor's risk of capital recovery. Therefore, high leverage will generate higher agency costs between creditors and shareholders, thereby having a negative impact on business performance.



#### **2.1.4. Signal theory**

Ross (1977) introduced signal theory. Ross (1977) argues that corporate managers can use capital structure and dividends to give signals about the future development prospects of the business. More specifically, the borrowing of businesses represents a positive signal of businesses about their future. The reason behind this is that the managers of the business will never put the business at risk of bankruptcy due to debt if they are uncertain about the future profitability of the business. Therefore, only businesses that have enough confidence in their ability to pay their debt obligations take loans, or in other words, only businesses that have firm confidence in their future profitability.

#### **2.2. Literature Reviews**

The impact of financial leverage on the financial performance of enterprises has been studied by many studies. However, the direction of impact in this relationship was found to be quite diverse. Ali et al. (2019) investigated the impact of factors on the profitability of listed companies in Malaysia for 4 years from 2012 to 2014. The results of the study show a negative relationship between financial leverage and corporate profitability. The reason that analysts give is that the more debt the business uses, the more vulnerable the business will be to bankruptcy and financial risks. Syed Shah (2013) used a sample of 35 listed companies from the Food Manufacturing sector of KSE. The study was conducted to understand the relationship between financial leverage and financial performance. The main variable used to test the hypothesis includes the independent variable as financial leverage and the dependent variable as the financial performance of sugar companies listed in KSE. Debt to equity ratio is used to measure financial leverage while financial performance is measured by Return on assets. The results of the study showed mixed results. There is a positive relationship between the debt-to-equity ratio and return on assets and revenue growth and a negative relationship between the debt-to-equity ratio and earnings per share. As a result, Sugar Companies listed on Karachi Stock Exchange can improve their financial performance by using leverage to a considerable extent and can contribute to boosting the economy.

Research by Ullah, A., Pinglu, C., Ullah, S., Zaman, M., & Hashmi, S. H. (2020) shows that the nexus between capital structure, firm-specific factors, macroeconomic factors, and financial performance in the textile sector of Pakistan. According to a study by Atta et al. (2020) analyzes the role of capital structure in the financial performance of 90 textile and garment companies in Pakistan (PSX) in the period 2008–2017. The study measures capital structure including variables: debt to equity, total debt to total assets and financial performance measured by ROE. The results show that the variable debt-to-equity structure (D/E) has a negative and significant relationship with ROE while the asset turnover ratio and firm performance show a positive relationship. negative relationship and not statistically significant. However, the control variable for firm size has a significant and negative impact on firm performance. Meanwhile, the ratio of total debt to total assets, which has an insignificant relationship with financial performance (ROE) holds true for agency theory (Jensen & Mecking, 1976).

Gul, S., & Cho, H. R. (2019) argues that an increase in short-term debt to assets leads to increased default risk while an increase in long-term debt to assets leads to a decrease in default risk. The study also shows that size, tangibility, and ability to pay interest are also important determinants of default risk.

Besides, there are also a few studies that find a positive correlation between debt and financial performance of enterprises (Javeed and Tabassam, 2018; Banafa, 2015).

#### **Research situation in Vietnam**

Research by Doan, N. P. (2014). Impact of capital structure on financial performance of enterprises after privatization in Vietnam. Doan (2014) studied the impact of capital structure on the financial results of

enterprises after equitization. The data includes 217 companies listed on the Vietnam Stock Exchange in the period 2007-2012. The independent variables used in this study include short-term debt, long-term debt, total debt, and dependent variables measuring performance including ROA and ROE. The study shows a negative relationship between capital structure and business performance at 1% significance level. Regression results show that long-term debt has a positive impact on ROA and ROE while short-term debt and total debt have a statistically negative impact on business performance after equitization. ROA and ROE.

Research by Phan, T. H. (2016) shows the Effect of capital structure on business results of industrial manufacturing enterprises. Phan (2016) also studies the impact of capital structure on the business results of industrial enterprises. The author uses ROA and ROE as dependent variables to show business results, independent variables are capital structure, business size, growth rate, structure of tangible fixed assets, business risk. enterprises, state ownership and Tobin's Q. Research using OLS, FEM and REM methods shows that the negative impact of capital structure factors on business results of enterprises is very certain and possible. statistical significance. This result is consistent with many other studies such as Zeitun, Tian, and Keen (2007), Trinh and Nguyen (2013). This means that the firms in the sample observe that increasing debt reduces operating efficiency.

Research by Le, T. M. P. (2017). The relationship between capital structure and financial performance in manufacturing enterprises. Le (2017) studies the impact of capital structure on financial performance by using audited financial statements of 219 companies listed on the Vietnamese stock market for the period 2010-2015. The study applies two research methods: correlation analysis and regression analysis on panel data. The author chooses the dependent variable as ROE, the independent variable as size, capital structure, solvency, asset structure, growth rate. Research results show that capital structure for all production groups has a positive impact on firm performance.

Research by Bui, D. T. (2017). Impact of capital structure and working capital on the financial performance of small and medium-sized enterprises. Bui (2017) studies the influence of capital structure and working capital on the financial performance of small and medium enterprises. The author uses data collected from 1,032 small and medium enterprises in Ho Chi Minh City in the period 2006-2014. Using ROA and ROE as dependent variables and different independent variables including average debt to average total assets; average short-term debt to average total assets (SDA) and average long-term debt to average assets (LDA), days receivable (ACR); inventory date (ICP), payable date (APP) and cash cycle ( $CCC = ACR + ICP - APP$ ). The author uses GMM regression method for analysis. According to the regression results, variable DA positively affects ROE and ROA. More specifically, the variable SDA has a positive effect on ROA and ROE. The results show that the use of short-term debt in the capital structure has an impact on increasing the financial performance of enterprises. For the LDA variable, the regression results show no evidence of the impact of LDA on ROE and ROA.

Research by Dao, T. T. B., & Ta, T. D. N. (2020). A meta-analysis: capital structure and firm performance. Dao and Ta (2020) aim to investigate the relationship between capital structure and firm performance using a meta-analytic approach. The authors confirm that firm performance is negatively related to capital decisions, which favors the agency cost trade-off model and pecking order theory.

Research by Nguyen, H. T., & Nguyen, A. H. (2020). The impact of capital structure on firm performance: Evidence from Vietnam. Nguyen and Nguyen (2020) use panel data of a research sample consisting of 488 non-financial companies listed on the Vietnamese stock market for a period of 6 years, from 2013 to 2018. The method used is the generalized least squares (GLS) method. In this study, company performance is measured by return on equity (ROE), return on assets (ROA) and earnings per share (EPS).

The ratios of short-term debt, long-term debt, and total liabilities to total assets are representative of capital structure. Firm size, growth rate, liquidity and the ratio of fixed assets to total assets are the control variables in the study. The empirical results show that capital structure has a statistically significant negative impact on firm performance. In addition, this effect is stronger in SOEs than in non-SOEs in Vietnam.

Research by Ngoc, N. M., Tien, N. H., & Thu, T. H. (2021). The Impact of Capital Structure On Financial Performance of Logistic Service Providers Listed On Ho Chi Minh City Stock Exchange. Research by Ngoc et al (2021) on the relationship between capital structure and performance of 30 logistics enterprises listed on the Ho Chi Minh Stock Exchange. HCMC (HOSE) period 2012 - 2019. Applying quantitative method (with Pool OLS, FEM, REM and FGLS models), the research results demonstrate that capital structure has a negative impact on profitability. represented by the company's ROA. With financial performance measured by ROE, the study does not show the statistical significance between the impact of capital structure on the profitability of logistics enterprises in this period.

Research by PHAM, C. D. (2020). The effect of capital structure on financial performance of Vietnamese listing pharmaceutical enterprises. This study examines the impact of capital structure on financial performance of 30 pharmaceutical companies listed on the Vietnamese stock market in the period 2015 - 2019. The study uses ROE as the dependent variable and four independent variables. including self-financing ability, financial leverage, long-term assets and debt-to-asset ratio, control variables such as firm size, fixed asset ratio, and growth rate. Using the method of least squares regression (OLS), the results show that the financial leverage ratio (LR), long-term asset ratio (LAR) and debt to total assets (DR) ratio are related. positively related to the performance of the business, while the self-financing ratio (E/C) has the opposite effect. to return on equity (ROE).

Although there are many studies with diverse content and approaches, conducted in many different areas and periods, however, with the strong economic fluctuations after the COVID-19 pandemic. and Vietnam's particular developing economy, there has not been a comprehensive study on this issue. Most of the studies focus on countries with developed economies, abundant capital in periods of stable environment, not affected by social isolation. Vietnam with an economy on the rise, from 2002 to 2020, GDP per capita increased 3.6 times, reaching nearly 3,700 USD. While the COVID-19 epidemic took place strongly, Vietnam still maintained a positive growth in 2019, GDP increased by 7.02%, in 2020 by 2.91%, in 2021 by 2.58%. At the same time, Vietnam is a potential country to continuously receive abundant FDI capital. In addition, there has not been any research on the relationship between capital structure and performance of multi-sector manufacturing enterprises - an important factor promoting Vietnam's economy.

Based on the theoretical basis and research overview, the authors put forward 2 research hypotheses

*H1: Financial Leverage affects the financial performance of the enterprise.*

*H2: The Covid shock affects the financial performance of enterprises.*

### **3. RESEARCH METHOD**

#### **3.1. Samples and data**

To test the influence of these factors on the capital structure of listed companies, the study uses data from companies listed on the Ho Chi Minh City Stock Exchange and the Hanoi Stock Exchange in the period 2014-2021. These enterprises have different sizes and assets belonging to the manufacturing industry. As a result, the sample includes balance sheet data of 163 manufacturing enterprises for 8 years. Balanced tabular data with 1296 observations.

The use of panel data has many advantages over other data types such as time series data, and cross-sectional data. Enhanced panel data captures the number of observations of the sample, which limits model defects such as multicollinearity. Panel data also contains more information than other data which makes it possible to study the dynamics of changes in cross-units over time.

The data on enterprises is collected from the annual reports of enterprises at Vietstock’s database.

**3.2. Research model**

Based on the theoretical background and overview of previous research, this study proposes the research model as described in Table 1 below:

The variables used and the scales of variables in the model are inherited from previous studies, besides, the model also adds the state ownership variable due to the characteristics of Vietnamese enterprises when being equitized with state-owned enterprises.

The independent variable is capital structure, which is measured by a measure: debt ratio (LEVERAGE). The calculation of the debt ratio is based on the book value of the business because the book value is easier to calculate and more stable than the market value of equity and debt.

Control variables are firm factors, including firm size (SIZE), growth rate (GROWTH), total asset turnover (TURNOVER), state ownership (STATE), and COVID-19 context (COVID).

$$\text{Model 1: } ROA_{i,t} = \beta_0 + \beta_1 \text{LEVERAGE}_{i,t} + \beta_2 \text{SIZE}_{i,t} + \beta_3 \text{GROWTH}_{i,t} + \beta_4 \text{TURNOVER}_{i,t} + \beta_5 \text{STATE}_{i,t} + \beta_6 \text{COVID} + \varepsilon_{i,t}$$

$$\text{Model 2: } ROE_{i,t} = \beta_0 + \beta_1 \text{LEVERAGE}_{i,t} + \beta_2 \text{SIZE}_{i,t} + \beta_3 \text{GROWTH}_{i,t} + \beta_4 \text{TURNOVER}_{i,t} + \beta_5 \text{STATE}_{i,t} + \beta_6 \text{COVID} + \varepsilon_{i,t}$$

Variables in the research model include 6 financial ratios that were transformed and computed from the original data. All variables are measured by percentage units. These variables were described in detail in Table 1

**Table 1. The list of variables in models**

Index	Variable name	Description	Measure
<b>Dependent variables</b>			
1	ROA	Return on Asset	Annual net Income/Total Assets
2	ROE	Return on Equity	Annual net Income/ Shareholder Equity
<b>Independent variables</b>			
1	LEVERAGE	Financial Leverage or Debt Ratio	Total Liabilities/ Total Assets
2	TURNOVER	Asset Turnover	Net Sales/Total Assets
3	SIZE	Firm size	Logarit of total asset
4	STATE	State Owner	Get value 1 if the enterprise is state-owned, 0 if the enterprise is not state-owned
5	COVID	Covid context	Get value 1 in covid years, get value 0 in other years
6	GROWTH	Sale Growth	(Sales in the current period- Sales in the previous period)/ Sales in the previous period

**3.3. Research methods**

As usual, for the panel data regression model, there are 3 commonly used methods: the least squares estimator model (Pooled OLS), the Fixed Effect Model (FEM) and Random Effect Model (REM). The Pooled OLS model is a model that cannot control each individual characteristic of each enterprise in the study, while the two models FEM and REM overcome this drawback. Therefore, the authors decide to use the FEM model and REM model, then use the Hausman test to determine whether the FEM model or REM model is suitable for research.

## 4. RESULTS AND DISCUSSION

### 4.1 Data description

The study uses panel data collected information of 163 enterprises in the manufacturing industry in the period from 2014 to 2020. This dataset was obtained from audited financial statements and annual reports that were published on the website <https://vietstock.vn/>.

**Table 2. Summary of statistics**

Variables	Observation	Mean	Standard deviation	Min	Max
ROA	1295	0,657044	0,692572	-0,2974155	0,7836998
ROE	1295	0,11533	0,1429616	-1,874727	0,9821288
LEVERAGE	1295	0,4568216	0,2031236	0,0026735	0,9669253
SIZE	1295	27,36115	1,497454	23,70761	32,81413
TURNOVER	1295	1,288175	0,7600385	-0,0011286	5,906429
GROWTH	1295	2,168696	31,93691	-1,000268	926,42
STATE	1295	0,3263889	0,4690724	0	1
COVID	1295	0,25	0,4331799	0	1

The average ROA of manufacturing enterprises is 65.7%, the lowest is -29.74% and the highest is 78.37% and the standard deviation of ROA is 69.26%. The average ROE is 11.53%, the lowest is 14.3%, the highest is 98.21%, the standard deviation is 14.3%. The average debt ratio is 0.46, the maximum is 0.97 times and the lowest is 0.0027 times of total assets. Firm size ranges from 23.7 to 32.8, standard deviation 1.5, and mean 27.36.

### 4.2. Correlation Matrix

The significance of the Pearson correlation coefficient is to test the linear correlation between the dependent variable and the independent variables and identify the possibility of multicollinearity between the independent variables when they are strongly correlated with each other. .

After identifying two variables with a linear correlation (with a significance level of 5%), the Pearson correlation coefficient (r) will range from -1 to 1 with the following values:

-  $|r| < 0.1$ : The pair of variables has a very weak correlation. When  $|r|$  The closer to 0, the weaker the linear correlation.

-  $0.1 \leq |r| < 0.3$ : The pair of variables has a weak correlation.

-  $0.3 \leq |r| < 0.5$ : The pair of variables has a mean correlation.

-  $|r| \geq 0.5$ : The pair of variables has a strong correlation. When  $|r|$  The closer to 1, the stronger the linear correlation. A value approaching 1 is a positive correlation, moving to -1 is a negative correlation.

**Table 3: Correlation Matrix**

	ROA	ROE	LEVERAGE	SIZE	TURNOVER	GROWTH	STATE	COVID
ROA	1,0000							
ROE	0,7955	1,0000						
LEVERAGE	-0,3756	-0,1169	1,0000					
SIZE	0,0641	0,1320	0,2921	1,0000				
TURNOVER	0,2405	0,2353	0,0344	-0,2637	1,0000			
GROWTH	0,0489	0,0537	0,0170	0,1690	-0,0277	1,0000		
STATE	0,1330	0,0956	-0,0880	-0,0707	0,1025	-0,0136	1,0000	
COVID	-0,0518	-0,0810	-0,0323	0,0694	-0,0879	-0,1176	-0,0999	1,0000

*In the table above, correlation values are explained as follows at 5% significance level:*

- With two dependent variables ROA and ROE, there are two independent variables LEVERAGE and COVID showing negative correlation with moderate and weak level. The remaining 4 independent variables are positively correlated with ROA and ROE variables.

- Between the two dependent variables ROA and ROE, there exists a strong positive correlation

#### 4.2. Results

Firstly, the fixed effect model (FEM) is applied, and its results reveals that, with the Prob>F = 0.000, the FEM is more suitable than OLS in both ROA and ROE models. After that, we conduct the random effect model (REM) along with the Breusch and Pagan Lagrangian test and found that with a low p value of 0.000 in both two models with ROE and ROA, REM is more suitable than OLS in all the two models.

**Table 4: OLS regression with dependent variable ROA and ROE**

Variable	OLS regression with dependent variable ROA		OLS regression with dependent variable ROE	
	Coef.	P - value	Coef.	P - value
LEVERAGE	-0,1584	0,000	-0,1449	0,000
SIZE	0,0134	0,000	0,0264	0,000
TURNOVER	0,0291	0,000	0,0569	0,000
GROWTH	0,0001	0,319	0,0001	0,276
STATE	0,0109	0,002	0,0178	0,025
COVID	-0,0086	0,024	-0,0256	0,003
Cons	-0,2663	0,000	-0,6142	0,000
R <sup>2</sup>	0,2853		0,1454	
Prob > F	0,0000		0,0000	

**Table 5: REM regression with dependent variable ROA and ROE**

Variable	REM regression with dependent variable ROA		REM regression with dependent variable ROE	
	Coef.	P - value	Coef.	P - value
LEVERAGE	-0,1478	0,000	-0,1410	0,000
SIZE	0,0151	0,000	0,0366	0,000
TURNOVER	0,0227	0,000	0,0391	0,000
STATE	0,0037	0,481	0,0097	0,458
COVID	-0,0112	0,000	-0,0319	0,000
Cons	-0,3085	0,000	-0,8671	0,000
R <sup>2</sup>	0,2832		0,1217	
Prob > F	0,0000		0,0000	
Wald Chi2 (5)	31,84		9,39	

**Table 6: FEM regression with dependent variable ROA and ROE**

Variable	FEM regression with dependent variable ROA		FEM regression with dependent variable ROE	
	Coef.	P - value	Coef.	P - value
LEVERAGE	-0,1496	0,000	-0,1353	0,000

SIZE	0,0136	0,000	0,0272	0,000
TURNOVER	0,0256	0,000	0,0506	0,000
GROWTH	0.0063	0,157	0.0139	0,178
STATE	-0.0101	0,000	-0.0271	0,000
COVID	-0,2694	0,000	-0,6306	0,000
Cons	-0,1496	0,000	-0,1353	0,000
R <sup>2</sup>	0,2832		0,1457	
Prob > F	0,0000		0,0000	
Wald Chi2 (5)	256,19		107,36	

Similar to the dependent variable ROA, the value of F test Prob > F = 0.0000 concludes that the regression model for the dependent variable ROE is also statistically significant. In addition, with p-value = 0.478 > 0.05, the GROWTH variable is also not statistically significant in this model. However, the independent variables explained only 12.27% of the variation of the dependent variable ROE.

At the 5% level of significance, the remaining independent variables are all statistically significant, specifically as follows:

- The LEVERAGE variable has a negative effect on the ROE variable. When LEVERAGE is increased by 1 unit, ROE decreases by 0.1410 units, other things being equal.

- The SIZE variable has a positive effect on the ROE variable. When SIZE is increased by 1 unit, ROE increases by 0.0365, other things being equal.

- The variable TURNOVER has a positive effect on the ROE variable. When TURNOVER is increased by 1 unit, ROE increases by 0.0390 units, other things being equal.

- The STATE variable has a positive effect on the ROE variable. When STATE is increased by 1 unit, ROE increases by 0.0097, other things being equal.

- The variable COVID has a negative effect on the ROE variable.

#### 4.3. Model selection test

The variance is the phenomenon where the residuals or errors of the model after the regression do not follow a random distribution and the variances are not equal. This violates the assumption of the linear regression model that the variance of the errors should be the same.

If the model only has variable variance error, the OLS estimate is still an unbiased and consistent estimator, although not the most efficient estimator. Because, in this case, the variance of the error cannot be minimized. Then, the regression coefficients and F-tests of the model become unreliable, and conclusions based on these tests will not be accurate.

The model uses Breusch - Pagan test to determine whether the regression model has variable variance or not. The results of the test for the two dependent variables ROA and ROE both return p-value = 0.0000 < 0.05, proving that both models encounter variable variance, and the OLS model is not suitable to estimate the above two variables.

**Table 7: Model selection test**

Test	Model - ROA	Model - ROE
LM Test	Chi2 (1) = 159,92 P-value = 0,0000	Chi2 (1) = 157,45 P - value = 0,0000
Hausman Test	Chi2 (5) = 0,00 P - value = 0,0000	Chi2 (5) = 0,04 P - value = 0,4111
Selection Model	REM	

The study uses Hausman Test to determine that the FEM and REM models are suitable for the dependent variables ROA and ROE. The results of the two tests for the dependent variable ROA and ROE both show p-value > 0.05, P = 1,000, concluding that there is no difference between the REM model and the FEM model.

Therefore, we choose the REM model used in the study to regress for two dependent variables ROA and ROE.

**4.4. Multicollinearity test**

Multicollinearity is a phenomenon where the independent variables are strongly correlated with each other. The regression model occurs with multicollinearity, which will cause many indicators to be skewed, leading to the results of quantitative analysis no longer giving much meaning.

The variance exaggeration factor VIF was used to determine the correlation between the independent variables, the strength of those correlations, and to identify multicollinearity.

The value of the VIF coefficient starts from 1 and has no upper limit with the following values:

- $1 \leq VIF < 2$ : There is no correlation between the independent variables and no multicollinearity.
- $2 \leq VIF < 5$ : There is a relative correlation between the independent variables and the possibility of multicollinearity.
- $5 \leq VIF < 10$ : There is a large correlation between the independent variables and there is a high possibility of multicollinearity.
- $VIF \geq 10$ : Surely multicollinearity occurs.

**Table 8: Multicollinearity test**

Variable	VIF	1/VIF
SIZE	1,23	0,813661
LEVERAGE	1,12	0,891705
TURNOVER	1,11	0,904612
GROWTH	1,04	0,958543
COVID	1,03	0,967739
STATE	1,03	0,972118
Ý nghĩa của VIF	1,09	

**4.5. Result**

**Table 9: Results**

	ROA	ROE
LEVERAGE	-	-
SIZE	+	+
TURNOVER	+	+
GROWTH	?	?
STATE	+	+
COVID	-	-



Thus, with the two hypotheses given at the beginning of the study, through the data analysis process, hypothesis H1 is rejected: Debt ratio positively affects the financial performance of the business, accepting the hypothesis. Theory H2: The Covid shock affects the financial performance of enterprises.

## 5. CONCLUSION

After descriptive statistics and analysis of a sample linear regression model of 163 manufacturing enterprises listed on the stock exchange from 2014 to 2021 to find the relationship between capital structure and corporate financial performance. We have two regression models as follows:

$$\text{Model 1: ROA} = -0.2694 - 0.1496*\text{LEVERAGE} + 0.0136*\text{SIZE} + 0.0256*\text{TURNOVER} + 0.0063*\text{STATE} - 0.0101*\text{COVID}$$

$$\text{Model 2: ROE} = -0.6306 - 0.1353*\text{LEVERAGE} + 0.0272*\text{SIZE} + 0.0506*\text{TURNOVER} + 0.0139*\text{STATE} - 0.0271*\text{COVID}$$

With the research results, the relationship between debt-to-asset ratio, enterprise size, total asset turnover, growth rate, state ownership, and COVID-19 has been shown. Other results were obtained with the expectation that financial leverage would have a significant impact on financial performance as measured by ROA, and ROE.

Financial leverage has a negative effect on financial performance. Hypothesis 1 is accepted.

The increase in debt increases costs, income must be deducted to pay debts, reducing profits, and reducing the efficiency of enterprise asset use. The results imply that both long-term and short-term debt are relatively expensive for firms in the manufacturing industry and this negative of debt with its profitability, the associated risk that outweighs the tax benefits, using Using long-term debt is no longer an effective tax shield but, on the contrary, increases the cost burden leading to reduced profit.

This result is similar to the results of Abor (2005), Ebaid (2008), Mahfuzah Salim and Dr.Raj (2012), Ullah (2020), Ngoc (2021), Chi (2018), along with many Research by other authors Balakrishnan and Fox (1993), Majumdar et al. (1999), Gleason et al. (2000), Tian and Zeitun (2007), Abbasali Pouraghajan (2012), Osuji Casmir Chinaemerem and Odit Anthony (2012). 2012), Mahfuzah Salim and Raj Yadav (2012), and Muhammad Umar et al. (2012) that financial leverage will negatively affect the financial performance of enterprises.

This can be explained for a few reasons as follows. First, according to agency cost theory, borrowing will reduce agency costs between owners and managers, with creditors acting as supervisors of the business in the use of capital. However, in Vietnam, this role of the creditor has not performed well, so borrowing does not reduce agency costs between owners and managers (Le & Phan, 2017). Therefore, borrowing a lot will increase financial costs and reduce the financial efficiency of enterprises.

Second, compared to the stock market, the debt market in Vietnam develops slowly, so listed companies in the manufacturing industry in the study period often raised capital by issuing shares instead of issuing debt. If enterprises raise capital from outside, they often must borrow from banks, so they cannot take advantage of the tax shield from debt issuance (Tianyu, 2013; Le & Phan, 2017).

In addition, studies on the impact of financial leverage on profitability have mixed results when conducted in developed and developing countries. Most of the studies are done in developed countries, and the relationship between capital structure and corporate profitability is positive, conversely, for developing countries and emerging markets like Vietnam it is a positive relationship. reverse system. Studies in developing countries such as Salim and Yadav (2012); Thien Vu (2013); Le and Phan (2017) also agree with the results of this study.

In addition to the results on the relationship between financial leverage and financial performance of manufacturing firms listed on the stock market, the findings on the influence of the remaining control variables in the model. The figure is also statistically significant.

Variables of firm size, total asset turnover, and state ownership have significant positive effects on the financial performance of enterprises. However, the growth rate variable in this study is not statistically significant.

The size of an enterprise has an impact on financial performance because the larger the production enterprise, the more advantages it has in terms of economy and market, attracting investors and businesses, and easy access to capital sources. Sponsorship leads to an increase in corporate profits as well. Besides, total asset turnover has a positive impact on the profitability of the business.

The variable COVID has a negative effect on the profitability of the company in the manufacturing sector. The entire social isolation to prevent the COVID epidemic caused the production and business activities of enterprises to stall, causing great economic losses and reducing the efficiency of capital use. At the same time, not making a profit during COVID but still having to pay production costs: warehousing costs, etc., making it difficult for businesses to make a profit.

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## DEFINING AND MEASURING FINANCIAL LITERACY OF YOUNG ADULTS: A CASE OF VIETNAM

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**ABSTRACT:** *The role of financial literacy in the context of integration, globalization, and economic development has garnered growing appreciation in both developed and developing economies to meet the requirements of the prevalence and sophistication of current financial products. This study posits a composite definition for financial literacy - a multidimensional concept with four components, namely financial attitude, financial behavior, financial knowledge, and financial skill – via the synthesis from previous studies before attesting such a measurement using quantitative data processing methods. The study used an online questionnaire to collect primary data, with a sample size of 521 young adults aged 18 to 30 residing in Vietnam. The reflectiveness of financial literacy through the abovementioned components is confirmed using Structural Equation Modeling approach. The results show that all four assumed components possess statistically significant correlations with financial literacy, in which financial behavior displays the greatest correlation, followed by financial skill, financial knowledge, and finally financial attitude.*

**Keywords:** *financial attitude; financial behavior; financial knowledge; financial literacy; financial skill; young adults.*

### 1. INTRODUCTION

As the global financial system progresses, financial products are becoming increasingly popular, diverse, and intricate. Such a notion begs for a certain level of knowledge for economic actors to effectively utilize these instruments and avoid potential issues. Hence, understanding financial concepts and being able to recognize financial tools are crucial for individuals in making financial decisions. The OECD (2022) notes that evaluating financial literacy is an essential aspect of a successful national financial education strategy. Studies have demonstrated that low financial literacy levels result in debt management and investment problems (Lusardi and Tufano, 2009), reduced stock market participation (van Rooij et al., 2011), inadequate retirement planning (Lusardi and Mitchell, 2014), and difficulties in accumulating and managing assets (Hilgert et al., 2003). Moreover, financial literacy is essential for managing cash flow and evaluating credit, mortgage, and bill payment behavior (Potrich et al., 2015). Therefore, research on financial literacy is of paramount importance for individuals and the global economy as a whole. Young people, in particular, should be a focus, as the financial challenges they confront are of higher severity due to their limited capacity both materially and mentally to recover from poor financial decisions (Lusardi et al., 2010). According to Lusardi et al. (2010), research on youth financial literacy is especially important for policymakers. Timely assessments of young people's financial literacy can facilitate devising efficient financial education programs targeted at youth and assist lawmakers in protecting young consumers.

Extant research on the financial literacy of young Vietnamese individuals is both limited and lacking in depth. Currently, there is no consensus on the definition and content of financial literacy, with some authors deem it as a single concept while others view it as encompassing three, four, or five aspects. This discrepancy complicates the creation of an accurate scale for measuring financial literacy, resulting in a significant research gap. To address this gap, the authors of this study sought to establish a unified definition

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of financial literacy and develop a scale based on a theoretical synthesis of prior domestic and international studies. Primary data on factors measuring Vietnamese youth's financial literacy were collected over three months (September to December 2022), focusing on individuals aged 18-30 from various regions of Vietnam. Data were collected through self-administered online questionnaires, yielding a total of 521 valid responses.

This study's structure comprises five sections. Following the introduction highlighting the rationale, an overview of research on financial literacy and its components is presented. Subsequently, the research methods used and a summary of the results and comparisons to previous studies are discussed, from which conclusions and some policy implications are drawn.

## **2. THEORETICAL FRAMEWORK AND RESEARCH HYPOTHESES**

### **2.1. Definition of financial literacy**

The term "financial literacy" is derived from "finance" – the management of money and "literacy" - the ability of humans to read and write (Zarcadoolas et al., 2006), which ability encompasses both understanding (knowledge of words, symbols, and basic mathematics) and applying (reading, understanding, calculating) this knowledge to daily life. Hence, "literacy" has been developed and expanded in other fields (Huston, 2010) such as information technology (computer literacy - Wecker et al., 2007); medicine (health literacy - Baker, 2006); communication (media literacy - Potter, 2010). Nonetheless, there was no consensus on the exact definition and components of financial literacy (Ouachani et al., 2021; Priyadharshini, 2017; Dewi, 2020). According to Huston (2010), most of the studies up to that point did not assert a specific definition of financial literacy. Furthermore, the phrase "financial literacy" is often used interchangeably with "financial education" and "financial knowledge" in both media and academia (Huston, 2010). It is conspicuous that the duplication of such inherently different concepts is misleading and confusing as financial knowledge is an integral component, but not encompassing, of financial literacy (Huston, 2010; Potrich et al., 2015; Dwiastanti, 2015; Dewi et al., 2020).

Since the 1990s, the extant study has proposed concepts in either a single dimension (the ability to use and understand concepts) or a combination of several components to assess the level of financial literacy (financial behavior, financial knowledge, financial attitudes, financial skills, financial confidence, etc.). These concepts will be compiled and classified according to their generality, thereby synthesized into an overarching concept in this research. The first study ever on financial literacy was published by Noctor in 1992, in which this concept was defined as the ability to make effective judgments and decisions regarding the use and management of money. This definition has since been used by researchers worldwide to this day by several researchers such as Oseifuah (2010), Gale and Levine (2010), and Bird (2008).

Bowen (2002) proposed that financial literacy should be regarded as the ability to understand financial terms and concepts necessary for everyday life. Similarly, Bumcrot (2013) and Fox et al. (2005) deemed financial literacy simply as understanding basic financial concepts in general; while Kadoya and Khan (2020) further highlighted that those concepts should be of interest rates, inflation, risk, and diversification. To sum up, these researchers focus on the financial knowledge aspects of financial literacy, although such an interpretation ensues several problems in developing a measurement scale for financial literacy regarding the fundamental difference between financial literacy and financial knowledge (Potrich et al., 2015). These definitions of financial literacy do not address the long-term goal aspect of financial literacy but focus on knowledge or behavior (effective decision-making) in the short term of the subject, different from multi-dimensional definitions of financial literacy.

The definition of financial literacy should be approached from a multidimensional perspective (Huston, 2010). Multidimensional financial literacy concepts not only have a broader scope than one-dimensional ones, including various aspects of financial literacy such as knowledge, attitude, skills, confidence, etc. but also address the goals that enhancing financial literacy aims towards. Specifically, that goal revolves around making effective financial decisions (Stolper & Walter, 2007; Kefela, 2011) as well as improving financial well-being (Hung et al., 2009; Miller et al., 2009). Such goals can be achieved by combining one's knowledge and understanding of basic financial concepts to form positive financial behaviors (Kefela, 2011) or in combination with financial skills demonstrated by computational abilities (Hastings et al., 2013).

Studying the relationships between components of financial literacy among Generation Y, Hung et al. (2009) postulated that financial literacy is the combination of both financial knowledge of basic financial concepts and the ability to apply that financial knowledge - financial skill - to managing budget spending effectively and improving financial wellbeing. According to this definition, financial literacy encompasses financial knowledge, financial skills, financial behavior, and their coordination to ultimately achieve financial well-being. The inclusion of these three components of financial literacy is supported by numerous studies, for example, Felipe et al. (2017), Potrich et al. (2015), and OECD (2022). Moreover, these studies also refer to a mutual outcome of "financial well-being" - the satisfaction with one's current living standards and financial independence - not relying on another individual financially (Brüggen et al., 2017). For further elaboration, Miller et al. (2009) also mentioned financial satisfaction as a goal but encompassed confidence as a component of financial literacy. Accordingly, financial literacy is the combination of understanding financial products with consumer confidence in tolerating risks and seizing opportunities to make effective decisions to enhance their financial well-being. The confidence and risk aspects in the world of finance are also addressed in the studies on the definition of financial literacy by Remund (2010) and Huston (2010).

From these definitions, the authors propose a composite definition for financial literacy as a combination of financial knowledge, financial skill, financial attitude, and financial behavior that help people make informed decisions to strive toward the goal of financial well-being. Therefore, via evaluation of knowledge of financial concepts, skills in handling financial information, positive financial attitudes toward money, and positive personal financial management behaviors, researchers can construct an effective measurement of the level of financial literacy for each individual. Such a method is also employed by other researchers in an attempt to quantify financial literacy. For example, Atkinson and Messy (2012), Felipe et al. (2017), OECD (2022) used financial knowledge, financial attitude, and financial behavior, Smit (2021) and Hung (2009) used financial knowledge, financial attitudes, financial behaviors, financial skills, and financial well-being.

## **2.2. The dimensions of financial literacy**

### **2.2.1. Financial attitude**

The concept of financial attitude refers to the emotions and opinions of each individual against financial matters, which have a direct effect on their subsequent behaviors and decision-making (Rai et al., 2019). One of the fundamental factors to assess an individual's level of financial literacy is their financial attitude (Priyadharshini, 2017; OECD, 2022). According to Khuc The Anh (2020), a person who appreciates short-term financial gains more than accumulation for the future also tends to rarely consider investments, setting aside a reserve for emergencies or making long-term financial plans. Apropos the spending habits of Asian students on a large scale, Shahryar and Tan (2014) concluded that the influence of financial attitudes on financial literacy is obvious. This result was further supported by Potrich et al. (2014, 2016) when performing an analysis on the same group of subjects in Brazil as well as Rai et al. (2019) when evaluating

the level of financial literacy of women working in India. According to Bhushan and Medury (2014), in order to raise the level of financial literacy of the economy as a whole, first of all, policies should begin with improving how people perceive money in particular and their perspectives on financial topics in general.

**H1: Financial literacy of Vietnamese young adults is reflected by their financial attitude.**

### **2.2.2. Financial behavior**

Financial behavior is a collection of human financial behaviors related to financial decisions and cash flow management. This is a basic and essential dimension of financial literacy (OECD, 2013), which is closely related to other contents. According to Atkinson and Messy (2012), positive financial behavior is also often associated with a congruous, long-term mindset and a notable level of financial knowledge about economic topics. In addition, the higher the level of financial literacy, the more positive and wiser the financial behavior of the subject is. This is manifested in a wide array of financial behaviors including retirement planning (Lusardi and Mitchell, 2007, 2011), saving (Widjaja et al., 2020; Lusardi and Mitchell, 2007), stock market participation (Van Rooij et al., 2011; Yamori and Ueyama, 2022), investment decision making (Ozdemir et al., 2021; Alaaraj and Bakri, 2020), personal finance management (Ansar et al., 2019; Bhargava et al., 2017). Therefore, it can be concluded that financial literacy shares a close correlation with financial behavior.

**H2: Financial literacy of Vietnamese young adults is reflected by their financial behavior.**

### **2.2.3. Financial knowledge**

Financial knowledge refers to an individual's understanding of financial issues and concepts. While financial knowledge is an important part of financial literacy, this concept is often used interchangeably with financial literacy (Huston, 2010). Using this approach, Lusardi and Mitchell (2007) developed a measurement of financial literacy by questions related to basic concepts such as interest rate calculation, understanding of compound interest, inflation, and risk diversification. This measure has since been used by many studies as a standard for measuring financial literacy when designing questionnaires. The correlation between financial literacy and financial knowledge is also reflected in the studies towards a positive approach such as Hung et al. (2009), Rai et al. (2019), Potrich et al. (2014, 2015, 2016), and Khuc The Anh (2020). Accordingly, it can be concluded that financial knowledge is one of the important factors in evaluating and proposing appropriate policies to help improve an individual's financial situation (Khuc The Anh, 2020).

**H3: Financial literacy of Vietnamese young adults is reflected by their financial knowledge.**

### **2.2.4. Financial skill**

Financial skill is the ability to apply existing financial knowledge to strive for a certain outcome, namely to make sound financial decisions and achieve financial well-being. According to Falahati et al. (2011), when individuals can manage daily expenses and make use of credit and saving, they are regarded as possessing financial skills as they can manage different financial aspects of their lives. The ability to manage financial resources can conduce to personal financial well-being. Financial skill is a less commonly mentioned component in financial literacy studies than the above constitutes. However, in recent years, there have been more and more studies recognizing the importance of the ability to apply financial knowledge to this practice when constructing a comprehensive financial literacy measure. Hung et al. (2009) combined financial knowledge, financial behavior, and financial skill to assess the level of financial literacy of millennials in the US. Similarly, Smit (2021) has also included financial skills in the financial literacy measure for college students, with financial skill that not only regulates financial knowledge and financial behavior but also has a direct effect on how different actors respond to varying economic fluctuations.



#### H4: Financial literacy of Vietnamese young adults is reflected by their financial skill.

##### Research method

The study opted for random sampling in view of unbiased results and accurate representation the target population (Collis and Hussey, 2003). This method allows all subjects in a population to have the opportunity to partake and become a part of the sample. The measurement instrument is a self-monitoring questionnaire, divided into five different sections, covering general personal information and then four components of financial literacy:

- Financial knowledge scale is developed by Van Rooij et al. (2011); Potrich et al.(2015); Smit (2020); OECD (2022). It consists of 6 true/false questions related to inflation, financial markets, risk, interest rates and diversification. The result will be the objective financial knowledge of respondents, quantified by the number of correct answers. Each question of financial knowledge is measured as a binary variable, with 1 denoting a correct answer and 0 denoting a false answer.

- Financial attitude scale is developed by Khuc The Anh (2020), Smit (2021), OECD (2022). It is a collection of different statements that carry attitudes towards money and lifestyle in general. Respondents were asked to indicate their level of agreement with these assertions, using a 5-point Likert scale where (1) indicates complete disagreement and (5) indicates complete consensus.

- Financial behavior scale is developed by Potrich et al. (2015); Smit (2021); Schokey (2002); OECD (2022). This is a set of several behaviors such as bill payment, spending habits, emergency money, and long-term budgeting. Respondents were asked to indicate how often they performed these financial behaviors, using a 5-point Likert scale where (1) indicates never and (5) indicates always.

- Financial skill scale is developed by Van Rooij et al. (2011); Potrich et al. (2015); Smit (2021); OECD (2022). It comprises 6 multiple-choice questions about basic calculations, time value of money, compound interest and money illusion to determine if respondents can apply their financial knowledge to real-life situations. Each financial skill question is measured as a binary variable, with 1 denoting a correct answer and 0 denoting a wrong answer.

The study uses the Structural Equation Modeling method to evaluate the latent variable without the observed indicator variable FL (Financial literacy), latent variables reflecting FL are financial attitude. (FA), behavioral finance (FB), financial knowledge (FK), and financial skill (FS). Validity of measurement model is established by assessing convergent and discriminant validity. For convergent validity, the study examines standardized factor loadings, average variance extracted, and composite reliability. Apropos discriminant validity, HTMT and Fornell & Larcker method are employed. Data were processed using RStudio 4.2.1.

##### Results and discussion

#### 4.1. Descriptive statistics

Through 1068 accesses to the questionnaire, 631 attempts were completed, yielding a response rate of 59.08%. After accounting for outliers, the official sample had 512 responses, amounting to an effective response rate of 81.14%.

**Table 1: Descriptive statistics**

Demographic		Number	Frequency
Gender	Male	234	45.70
	Female	278	54.30
Education level	Primary education	18	3,52
	Secondary education	318	62,11
	Tertiary education	150	29,30

	Post-graduate	26	5,08
Marital status	Single	458	89,45
	Married	54	10,55
Employment status	Do not work	135	26,37
	Work part-time	238	46,48
	Work full-time	139	27,15
Income per month	Below 1 million VND	58	11,33
	1 million to 5 million VND	254	49,61
	5 million to 10 million VND	117	22,85
	More than 10 million VND	83	16,21

Source: Data processed

## 4.2. SEM results

### 4.2.1. Confirmatory factor analysis results

Confirmatory factor analysis was performed on the sample collected using structural equation modeling (weighted least square mean and variance adjusted estimator) in *lavaan* package from R4.2.1. We assessed the fitness of a second-order reflective model with the first-order reflective model consisting of 4 latent constructs and their respective indicators.

**Table 2: Validity assessment results**

	1.	2.	3.	4.
<b>1. Financial Attitude</b>	0.53 <u>0.82</u>			
<b>2. Financial behavior</b>	0.34 (0.43)	0.50 <u>0.81</u>		
<b>3. Financial knowledge</b>	0.20 (0.20)	0.19 (0.21)	0.51 <u>0.88</u>	
<b>4. Financial skill</b>	0.22 (0.34)	0.18 (0.45)	0.42 (0.53)	0.54 <u>0.86</u>

Note: values in bold are average variance extracted; values underlined are composite reliability; values in brackets are HTMT index; values with no special formatting are squared correlations between latent variables.

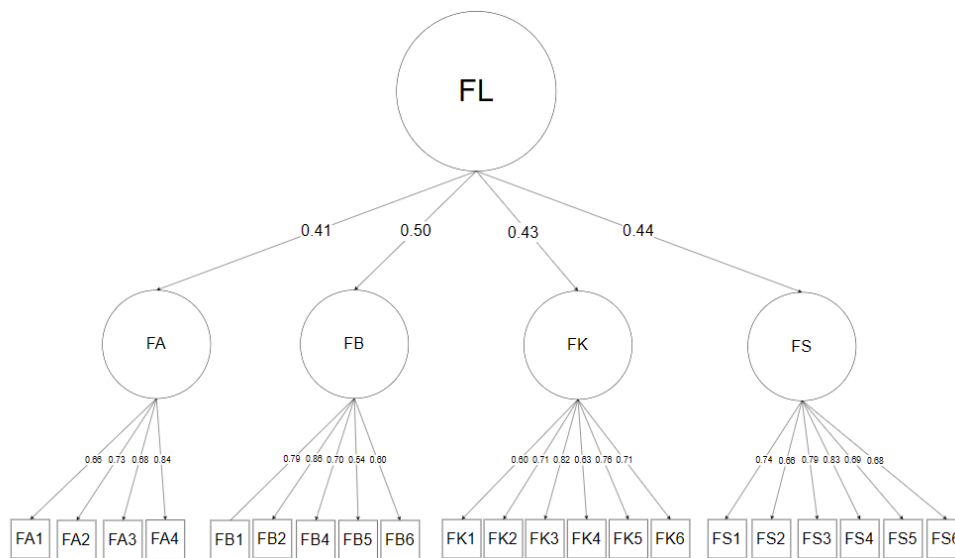
Source: Data processed

The table results show that the HTMT indices between the indicators are all below the threshold of 0.85 ensuring the distinction between the indicators (Henseler et al., 2015). According to the Fornell-Larcker method, AVE of all latent variables is greater than the squared correlation coefficient of that latent variable with the remaining latent variables. Hence, the correlation of each variable with itself is greater than that of other latent variables, ensuring discriminant validity to perform the next analysis steps. Convergent validity was evidenced by average variance extracted  $>.50$  and composite reliability  $>.70$  (Garver and Mentzer, 1999; Hair et al., 2009) for all constructs. All items exhibited a significant loading on their designated observed indicators, with the standardized loadings ranging from 0.50 to 0.89 - qualified for further analysis (Truong and McColl, 2011; Hulland, 1999). There is also evidence of a good model fit with  $\text{Chisq/df} = 1.93 < 2$ ;  $\text{CFI} = 0.992$ ,  $\text{TLI} = 0.992$ ,  $\text{GFI} = 0.995$ ,  $\text{RNI} = 0.992$ ,  $\text{IFI} = 0.993$ ,  $\text{AGFI} = 0.993$ , all have satisfied the condition that greater than 0.95;  $\text{RMSEA} = 0.048 < 0.08$ ;  $\text{PNFI} = 0.71 > 0.5$ . Thresholds follow those proposed by Hair et al. (2009); Schumacker and Lomax, (2004, 2010).

Since the criteria of validity have been met, this research concluded the measurement model is fully compliant with the requirements.

#### 4.2.2. Path analysis results

Figure 1: SEM model



Source: Data processed

##### a. Financial literacy is reflected by financial attitude.

The results from the model show that the correlation coefficient of financial literacy with financial attitude is 0.41 with  $p$ -value = 0.000. This means that financial literacy is positively reflected by financial attitude. This is also the conclusion of Potrich et al. (2014, 2016), Shahryar and Tan (2014), Rai et al. (2019), Priyaharshini (2017), OECD (2022). When consumers feel less financially constrained, they tend to perceive themselves as having an enhanced financial position (Sharma and Keller, 2017), thus modifying their financial behaviors accordingly. In other words, the more accurately a subject assesses the fluctuations within the economy, the more positive his ability to understand and invest in savings is. Therefore, improving financial attitude can boost the level of financial literacy (Vohs and Baumeister, 2011). Moreover, to improve the overall level of financial literacy economy-wide, policymakers need to commence with improving the way people see money and financial topics (Bhusan and Medury, 2013).

##### b. Financial literacy is reflected by financial behavior.

The results from the model show that the correlation coefficient of financial literacy with financial behavior is 0.50 with a  $p$ -value = 0.004. This means that financial literacy is positively reflected through financial behavior. This is also the result of Lusardi and Mitchell (2007, 2011), Ozdemir et al. (2021). Financial behavior is a collection of human financial behaviors related to financial decisions and cash flow management. The better the financial behavior, the higher the financial literacy level. Financial behavior is reflected in activities undertaken or avoided by the individual that can either manifest as positive or negative. Atkinson and Messy (2012) remarked that how a person behaves will have a significant effect on their financial well-being. Positive financial behavior is also often associated with long-term thinking, coupled with a significant level of understanding of economic topics. Accordingly, positive financial behaviors of individuals enhance their financial literacy and their level of financial satisfaction (Staten and Johnson, 2010), whereas negative financial behaviors like largely depending upon credits and loans to pay for daily expenses weaken their financial well-being.

##### c. Financial literacy is reflected by financial knowledge.

The results from the model show that the correlation coefficient of financial literacy with financial knowledge is 0.43 with a  $p$ -value = 0.000. This means that financial literacy is positively reflected through financial

knowledge. This result is similar to the previous conclusions of Hung et al. (2009), Rai et al. (2019), Potrich et al. (2014, 2015, 2016), and Khuc The Anh (2020). Thus, for Vietnamese young adults, financial knowledge is one of the factors reflecting financial literacy, or high financial literacy is expressed through correspondingly high financial knowledge. When someone is knowledgeable about financial matters, their ability to invest and save is better and consistent with their purposes. (Khuc The Anh, 2022). Kempson (2009), upon studying financial capability and its components, concluded that financial knowledge serves as the basis for the ability to effectively handle everyday financial issues and to make sound decisions accordingly. The acquisition of such financial knowledge is present in several manners: either directly from experience, education, and training, or indirectly via passive instillation of family, friends, media, and surrounding financial information.

**d. Financial literacy is reflected by financial skill.**

The results from the model show that the correlation coefficient of financial literacy for financial skill is 0.44 with a p-value = 0.001. This means that financial literacy is positively reflected by financial skill. The importance of financial skills is evidenced by the positive or negative consequences that an individual might experience, given their level of financial skills (Smit, 2021). A good set of financial skills enable individuals to make informed decisions about their money and minimize their chances of being misled when faced with financial matters. (Priyadharshini, 2017). Personal financial problems can be caused by a lack of basic financial skill in preparing a budget and an inability to understand credit and investment instruments or other financial products. The lack of financial literacy of individuals is one of the reasons leading to financial crises (Lusardi and Mitchell, 2011). Financial skill can be improved through a variety of approaches, including education, training, and mentoring. Improvements in financial skill can also be made by raising basic financial skill, such as preparing budgets and gathering financial information (Lusardi and Mitchell, 2011).

**Table 3: Hypotheses conclusions**

Hypothesis	Relationship	Path coefficient	p-value	Conclusion
H1	FL → FA	0.41	0.000	Accepted
H2	FL → FB	0.50	0.004	Accepted
H3	FL → FK	0.43	0.000	Accepted
H4	FL → FS	0.44	0.001	Accepted

*Source: Data processed*

Thus, from the four results above, this research concludes that financial literacy is reflected by four components including financial attitude, financial behavior, financial knowledge, and financial skill, or hypotheses from H1 to H4 are accepted. In particular, the relationship between financial literacy and financial behavior is the strongest, followed by financial skill and financial knowledge, and lastly financial attitude.

**Conclusion and policy implications**

In conclusion, by synthesizing definitions from extant domestic and foreign research, this study has drawn a composite definition for the concept of financial literacy - a combination of financial knowledge, financial skill, financial attitudes, and financial behavior- enabling people to make sound decisions and strive for financial satisfaction. This approach is a theoretical complement to future studies on the topic of financial literacy, an extension of the two current major traditional approaches which only take into account financial knowledge or include three components, namely financial knowledge, financial attitude, and financial behavior. In practical terms, based on the results from the quantitative model, the study has confirmed the simultaneous reflectiveness of the four components, in which financial behavior and financial skill, respectively, have the greatest impact on financial literacy, followed by financial knowledge and lastly financial attitudes.

From these results, the authors propose some policy implications with an aim to improve financial literacy for Vietnamese youth, with a focus on financial education at both governmental and local levels.

*First*, the central government needs to account for the education and enhancement of financial literacy of Vietnamese youth in the long run. At the same time, it should be made crystal clear that the purpose of improving financial knowledge and skills for young people is to facilitate a positive attitude change towards finance, hence enabling them to make sound decisions and positive financial management behaviors based on this knowledge.

*Second*, there should be training classes for lecturers - the leading force in imparting financial literacy to young people - with quality, in-depth understanding of financial literacy and its significance for young people and the Vietnamese economy in general.

*Third*, there should be seminars and talk shows to share, orient, and nurture positive financial behaviors for young people such as budget planning, paying bills on time, and avoiding bad credit and other debts.

*Fourth*, local authorities need to develop mobilizing programs imparting a positive financial attitude for young people in the local and promote information and communication on financial literacy and the role of youth in finance.

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## A RESEARCH ON THE IMPACT OF FINANCIAL INDICATORS ON EARNINGS MANAGEMENT – EMPIRICAL EVIDENCE IN LISTED FIRMS ON THE STOCK MARKET IN VIETNAM

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**ABSTRACT:** *In the context that Vietnam's stock market is volatile as it is now, investors need to develop a careful and thorough strategy. Many factors affect the investment portfolio decision, one of which is the profit target on the business's income statement. It may also be what motivates managers to implement "Earnings management" to attract investors to participate. To learn and evaluate more about the factors affecting "Earnings management", the research team carried out the topic "Research on the impact of financial indicators on earnings management - Empirical evidence" in companies listed on the Vietnamese stock market. By quantitative research method, the research team collects secondary data from 173 companies listed on the Vietnam stock market in the period from 2017 to 2021. From the theoretical basis and previous studies, the group has included six indicators in the model of financial indicators affecting "Earnings management". Among them, the team found that there are two indicators that previous studies have not paid attention to, namely, "Dividend Payment Ratio" and "Sustainable Growth Rate". The obtained results show that there are two variables that have a positive impact on "Earnings management", that is: "financial leverage and return on equity". While other variables such as: "return on assets, company size, sustainable growth rate and dividend payout ratio" do not affect earnings management. Based on the obtained results, the research team makes recommendations to state agencies, listed companies and investors to identify and control Earnings management by looking at abnormal fluctuations in financial indicators.*

**Key words:** *Earnings management, financial indicators, listed firms, Viet Nam*

### 1. INTRODUCTION

Profit is considered one of the most important and concerned factors by many stakeholders, and reflects the financial performance and growth prospects of an entity. It can be seen that profit is both a goal and a driving force to promote effective development of enterprises. Therefore, enterprises in general and listed companies in particular have/ can perform the act of adjusting financial activities in important periods to serve management. This leads to users of information misinterpreting the actual financial situation of the business, affecting the decisions of many parties.

There are many definitions of Earnings management given by researchers around the world. Each researcher has a different view of Earnings management, but all lead to the same end result in the financial information provided to the outside of the enterprise being changed by the management methods. According to Schipper (1989): "Earnings management is the adjustment of profits to achieve a previously set goal of the manager"; it is "a deliberate intervention in the process of providing information. finance to achieve personal goals". According to Akers et al. (2007): "Earnings management as managers' efforts to influence or "manipulate" the income statement using a special accounting method, which recognizes non-recurring items, delay or expedite the recognition of revenue or expense transactions, or use other methods designed to affect short-term income." According to Beneish (2001) and Jiraporn et al. (2008), Earnings management aims at the interests of stakeholders by enhancing the value of the information provided to the outside.

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There have been many domestic and foreign researches on the factors affecting the behavior of earnings management.. In the world, there are studies like that of Priharto & Rahayu (2019) with the topic “Determinants of Earnings Management and Its Implication on the Integrity of the Financial Statement” and the results calculated by the author are that financial leverage has a strong and positive impact on financial management, whereas audit size and quality have a negative impact on earnings management. Sadeghi & Zareie (2015) study on “Relationship Between Earnings Management and Financial Ratios At The Family Firms Listed In The Tehran Stock Exchange” and the research results give: “general ratio, quick ratio, receivables turnover, working capital, working capital to goods ratio, inventory turnover, return on capital ownership, return on sales, return on invested capital, return on assets, debt ratio and debt settlement ratio” have a positive impact on earnings management, conversely ratio of debt to equity and debt to assets” has a negative impact on earnings management, while “interest coverage ratio” has no impact on earnings management.

The question is whether some famous income manipulation identification models in the world are suitable for Vietnam. According to Pham (2012), the Modified Jones adjust model test to identify and detect the income management behaviors of enterprises listed on the Ho Chi Minh Stock Exchange (HOSE) because of the measurement coefficient of R2 is 3.8%. Meanwhile, R2 is 1.6% (Nguyen and Pham, 2015), R2 is 46.3% (Dechow et al., 1995), R2 is 89.6% (Kothari et al., 2005). In Vietnam, many related studies have also been carried out such as those of Tran Thi Thuy Kieu (2021), Le Thi Phuong Trinh (2019), Tran Thi Kim Ngan (2019), Nguyen Thi Thanh Ha (2017), ... with different sample size, scope and earnings management measurement model gave different results.

The research team found that there are no empirical studies in Vietnam testing the variables “Dividend payout ratio” and “Sustainable growth rate” affecting the behavior of earnings management. Meanwhile, these are also two important variables to evaluate the capacity of enterprises.

Based on the above bases, the research team will determine the influencing financial ratios and consider the level of impact on the earnings management in Vietnam with empirical evidence in 173 companies listed on Vietnam’s stock market including HOSE, HNX and Upcom (except for banks, insurance companies, and financial institutions due to different accounting regulations) in the period 2017-2021. Through this study, users of the Financial Statements of listed companies have a better overview in making economic decisions. Also through the findings, several recommendations are made to reduce earnings manipulations and improve financial data in the financial statements of listed companies.

The topic’s specific objectives are as follows:

- Determine the influencing factors & measure the impact of financial ratios on earnings management.
- Provide empirical evidence from companies listed on the Vietnamese stock market.
- Contributing and further improving the earnings management research database in Vietnam.
- From there, propose solutions to limit the behavior of earnings management in the process of managing Vietnamese enterprises that adversely affect the stock market as well as support appropriate decision making for stakeholders such as countries, investors, listed companies, audit firms.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Earnings management classification**

#### **2.1.1. Classification of Earnings management**

Previous studies have shown that earnings management behavior is often implemented by managers through the following two ways: one is to choose accounting policies, and the other is to govern rising economic transactions.

### **2.1.1.1. Earnings management through a selection of accounting policies**

Corporate managers can practice earnings management through the selection of accounting policies in some items to benefit themselves and lead to the quality of the information presented on The financial statements will be reduced.

Some researches have indicated that: Moyer's study (1990) examined the correlation between the choice of accounting policy and the capital adequacy ratio at banks. Research by McNichols & Wilson (1988) investigates the profitability management of managers by taking advantage of General Accepted Accounting Principles (GAAP). Keating & Zimmerman's (1990) study on "change of depreciation policy with tax and promotion of investment opportunities".

### **2.1.1.2. Earnings management through dominating rising economic transactions**

The researches of Roychowdhury (2006), Cohen et al. (2010) and Zang (2011) are the leading studies on earnings management through adjusting the "policies that govern discounts, activities, etc. sold on credit, costs incurred by the company". The results show that managers implement one or more of the above ways to implement earnings management. The administrator can apply for a special discount program or relax the terms of the credit policy to increase revenue if the set revenue target has not been achieved near the end of the accounting period. These acts are through arising economic transactions to make profit adjustments because the ultimate purpose of these acts is to govern cash flows resulting in revenue and related expenses being adjusted according to expectations.

## **2.2. Some Earnings management techniques**

### **2.2.1. Earnings management through an accrual basis**

#### **2.2.1.1 "Cookie jar reserve" technique**

Cookie Jar accounting is a method used by unethical company managers to influence financial statements (Keiso, 2012). The company will create a "Cookie Jar" (cake jar) for the purpose of "saving" profit. The "Cookie Jar" is made up of provisions, pre-recognition of expenses, and deferred revenue recognition.

"Cookie Jar" usually takes the form of a cumulative liability account. "Cookies" credited to the account the actual liability is not owed to anyone. For example, when estimating warranty liability, a manager may report \$110 when only \$100 is claimed. An additional \$10 reduces current earnings but gives managers the opportunity to increase reported earnings in future periods by reducing their estimate of a virtual liability.

#### **2.2.1.2 The "take big bath" technique**

Big bath is an accounting term defined by a company's management team that intentionally manipulates its income statements to make poor results even worse in order to make future results look better. It's often done in a relatively bad year so that a company can artificially raise the next year's earnings. Recording as many expenses as possible during the period during which the transfer takes place will show better operating results in the coming years (Jones, 2011).

#### **2.2.1.3 The technique of "Big Bet on The Future"**

"Big bet on the future" - this is a strategy of betting on the future through mergers, acquisitions, and acquisitions. All expected future returns are wagered at present. Therefore, in the future, if the actual profit is higher, the company will continue to make a profit, otherwise it will suffer a loss.

The company "bets on the future" through the application of loopholes in the provisions of accounting standards to record all future profits in the current year.

#### **2.2.1.4. Remove the array of inefficient operations (“Throw out” a problem child)**

This technique involves the manager’s judgment to remove a subsidiary when the group’s earnings are dragged down by the underperforming or inefficient subsidiary for the purpose of saving or improving financial and revenue results, include: the complete liquidation of a subsidiary, severing a subsidiary or creating a special purpose entity (SPE) to exchange financial assets and equity. During this process, earnings can be changed in various ways, such as by selling a subsidiary, or transferring or exchanging shares.

As a result, tax-adjusted net profit or loss is reported in the current financial statements, and thus the company distributes earnings to shareholders who are perpetual investors (Burgstahler & Eames, 2006).

#### **2.2.1.5 Applying new accounting regulations (Introducing new standards)**

Accounting standards enhance the transparency of financial reporting in all countries. New laws and regulations are enacted as a result of business changes. The principles can be adjusted without the profit being changed. When each new accounting standard is issued, it takes a long period of two to three years for every converting business to adopt that standard. The early voluntary adoption of new accounting standards can be an opportunity for earnings management.

Example of changing the depreciation method from the discounted balance to the straight-line method.

#### **2.2.1.6 Write off of long time operating Assets**

This involves management’s discretion in selecting write-off methods and periods, changing the method of estimating the salvage value or changing the asset type or usage.

Recorded expenses for long-term assets used during the period are recognized through amortization and depreciation. For example, the administrator can optionally prescribe the method of reducing assets: write down by term, according to the estimated residual value.

### **2.2.2 Earnings management through rising economic operations**

L. Sun & Rath (2010) claim that managers can use earnings management to move profits to an earlier or later accounting period through actual transactions. By arranging actual current-year transactions, a firm can also influence its revenues, even though those transactions might not ultimately be advantageous to the business.

Driving sales with pricing and credit policies. Businesses may drop their selling prices, relax their credit policies, issue invoices in advance to record revenue, or enter into “returnable sales” contracts in an effort to boost sales. The second strategy is to make public a plan to raise selling prices at the start of the following year. For instance, an automaker announced plans to raise selling prices beginning in the first quarter of 2013 in order to quickly turn a profit in the fourth quarter of 2012. This trick allows the company to increase profits this year but may decrease them over the next few years and the increase in selling price next year will also reduce the company’s competitiveness in the market.

Cutting useful costs such as research and development (R&D), advertising costs and equipment maintenance costs can be a way to increase profits but are also critical to the long-term growth of the business, so this solution can be a sacrifice of potential future profits.

Selling productive investments: the company can sell profitable investments to increase profits for the current year. Therefore, applying the above method means that the company voluntarily forgoes the potential for large returns from these investments in the following years.

### **2.3. Motivation for Earnings management**

According to Watts and Zimmerman (1990), the motivation of earnings management may stem from the need to raise capital (beautify financial statements to attract investors), the board of directors wants to increase salaries, bonuses or promotions. Because of good business results, or possibly because of the political cost hypothesis, businesses practice earnings management in order to avoid government intervention or enjoy tax incentives. According to Burgstahler and Eames (2006), earnings management

behavior increases when it meets the expectations of analysts and forecasters in management. Bergstresser and Philippon (2006) show that managers tend to manage earnings in an upward direction when they have stock options to increase their personal wealth.

It can be seen that the main motivations for earnings management behavior include: benefits based on contracts based on profit data on financial statements, owner's expectations and capital markets, government tax and legal regulations.

## **2.4. Foundational theories for earnings management**

### **2.4.1. The signal theory**

Signaling theory was originally developed to clarify information asymmetries in the labour market; the theory that the existence of information asymmetry can also be considered as a reason for good companies to use financial information to send signals to the market.

Information released by managers to the market reduces information asymmetry and is considered a good sign. Managers engage in earnings management to create a smooth and growing earnings stream over time that will allow them to influence stock prices. In summary, when information asymmetry exists, signal theory offers an equilibrium.

A number of studies have investigated the signaling effect on reported earnings and concluded that performance measures, namely: profitability, firm size and liquidity, drive managers involved in earnings management from "Watson A. Shrivess P. Marston C. Voluntary disclosure of accounting ratios in the UK. Signaling theory suggests that when a company's performance is good, managers will signal the company's performance to investors, stakeholders and the market by making public statements which inferior companies cannot. By increasing disclosure, directors expect to get more benefits: better reputation and increased value of the company. In contrast, companies with poor performance may choose to remain silent rather than disclose unsatisfactory performance.

### **2.4.2 The agency theory**

Agency theory, also known as authorization theory, finds differences in interests and unbalanced information structures between employers and employees when considering the relationship between these two objects. The interests of the owner (shareholder) can be harmed by the actions of the representative (manager) when the representative takes actions for the purpose of maximizing his or her personal interests.

Earnings management occurs when managers and executives of a company try to perform acts with the purpose of changing or affecting the output of financial statements by manipulating non-cash payments or choose suitable accounting policies to change accounting profits in their favor (Healey, 1985; Holtahaisen, Larcher & Sloan, 1995).

In the relationship between managers and shareholders, information imbalance often occurs to the disadvantage of shareholders. The managers can make decisions to maximize personal benefits instead of maximizing corporate value.

In the relationship between shareholders and creditors, the information imbalance takes place to the disadvantage of the creditor. Managers can adopt different accounting policies to implement Earnings management and increase the market value of the business to receive favourable terms in their debt contracts.

## **3. RESEARCH METHODS**

### **3.1. Proposed research and research hypotheses**

The authors choose a research model based on the results obtained from domestic and foreign studies and present the background theory to explain Earnings management. The authors consider the following relationships:

- **Financial leverage ratio (donbay):** research by Jelinek (2007) and Wasimullah et al., (2010), Safe Lazzem et al. (2017) expect a relationship between financial leverage use and governance earnings on an accrual basis. Accordingly, the authors hypothesize that the more leveraged firms use, the higher the level of earnings adjustment (**hypothesis H1**).

- **Return on total assets (ROA):** studies by (Sadeghi & Zareie, 2015), (Tran Thi Kim Ngan, 2019), (Ngo Hoang Diep, 2019) show a positive ratio between ROA and Earnings management. However (Gill et al., 2013), Kothari et al. (2005) showed an inverse ratio. Considering the agency theory and the signal theory, the authors hypothesize that there is an inverse relationship between the ROA variable and the level of earnings management (**hypothesis H2**).

- **Size:** The larger the company, the more profitable it is expected to be. Therefore, companies promote earnings management to achieve the desired level of profit. Research by (Le Thi Phuong Trinh, 2019), (Nguyen Dinh Huy, 2017) and (Phan Thi Thanh Trang, 2015) show that company size and Earnings management have a positive relationship. The authors hypothesize that the larger the firm size, the higher the level of earnings management (**hypothesis H3**).

- **Sustainable growth rate (benvung):** represents the maximum growth rate with current resources or sales that the business can achieve without increasing equity or increasing debt ratio. Achieving a “sustainable growth rate” is the goal of enterprises, from which businesses tend to “manage profits”. Therefore, the authors hypothesize that the larger the company’s “sustainable growth rate”, the higher the level of earnings management (**hypothesis H4**).

- **Return on equity(ROE):** the higher the ROE ratio, the better, showing how effectively the company has used its capital and how profitable it is. Therefore, businesses can implement Earnings management to achieve the desired ROE. Research by Sadeghi & Zareie (2015) also shows that the results between “Return on equity” and Earnings management have a positive impact on each other. The authors hypothesize “Return on equity” is higher the level of earnings management (**hypothesis H5**).

- **Dividend payout ratio (cotuc):** this is one of the factors that help attract investors, so this can motivate businesses to implement Earnings management. The authors hypothesize that the higher the dividend payout ratio, the higher the level of earnings management (**hypothesis H6**).

**Table 3.1 Proposed Research Hypotheses**

Hypothesis	Content	Expected
H1	The more “financial leverage” a company uses, the higher its ability to manage earnings.	+
H2	The higher the “return on total assets”, the lower the ability to manage earnings	-
H3	The larger the “company size”, the higher the ability to manage earnings.	+
H4	The higher the “sustainable growth rate”, the higher the ability to manage earnings	+
H5	The higher the “return on equity”, the better the ability to manage earnings	+
H6	The higher the “dividend payout ratio”, the better the ability to manage earnings	+

### 3.2. Measurement of variables in the research model

#### 3.2.1. Measure the dependent variable

To measure the level of accrual-based earnings management, the research team used the technique of the adjusted Jones model of P. M. Dechow et al. (1995), used in many studies and evaluated as appropriate in Vietnam. Nam and used in research papers by Nguyen Thi Thu Nguyet 2022, Nguyen Thi Kim Cuc and Pham Thi My Linh 2018, Trinh Hiep Thien and Nguyen Xuan Hung 2016...

According to the model of P. M. Dechow et al. (1995), the research team calculates the total accrual (TAit) of each enterprise according to the formula:

$$TAit = (\Delta CAit - \Delta CASHit) - (\Delta CLit - \Delta RLTPit) - DEPit$$

Then, the authors used SPSS to run the data by industry and determine the octal accrual (DA) as the remainder of the equation:

$$\frac{TAit}{Ait-1} = \alpha \frac{1}{Ait-1} + \beta1 \frac{\Delta REVit - \Delta ARit}{Ait-1} + \beta2 \frac{PELit}{Ait-1} + \beta3 \frac{ROAit}{Ait-1} + \epsilon t$$

In there:

- ΔCAit: Volatility of short-term assets in year t
- ΔCASHit: Movement of money in year t
- ΔCLit: Volatility of short-term debt year t
- ΔRLTPit: Short-term loan volatility
- DEPit: Depreciation and allocation
- Ait-1: Book value of the company’s total assets at year t-1
- ΔREVit: Change in revenue between year t and t-1
- ΔAR: Change in receivables between year t and t-1
- PPEit: Value of tangible fixed assets at year t
- εt: Represents abnormal accruals DA ROA: DA
- ROA: after-tax return on total assets

**3.2.1. Measure the independent variable**

**Table 3.2 Measurement of independent variables**

Numerical order	Variable name	Variable symbol	Measurement formula
1	Financial leverage ratio	donbay	donbay = Liabilities year t/equity year t
2	Return on total assets	ROA	ROA = Profit in year t/total assets in year t
3	Company size	size	size = log(total assets)
4	Sustainable growth rate	benvung	benvung = ROE * (1- Dividend payout ratio)
5	Return on equity	ROE	ROE = Profit in year t / equity in year t
6	Dividend payout ratio	cotuc	cotuc = Dividends/profit after tax

(Source: group of authors)

**3.3. Research paper design**

**3.3.1. Research sample**

The study selects a sample by non-random sampling method; that is, companies listed on the stock market can get all the information they need to collect, except for companies in the finance, banking and insurance industries. Dangerous because companies have distinct characteristics. The data is taken from active and listed companies for the period 2017-2021.

**3.3.2. Data collection**

Data is collected from the company’s financial statements: <https://cafef.vn/> and <https://www.cophieu68.vn/>

### 3.3.3. Data analysis:

Through SPSS and Excel software, the research team uses the following analytical techniques to process data to test the impact of financial indicators on Earnings management.

#### 3.3.3.1. Descriptive statistics:

Briefly describe the basic characteristics and related properties of data through ratios such as mean (means), maximum and minimum values (max, min), and standard deviation (std), ...

#### 3.3.3.2. Correlation analysis

Pearson correlation analysis to test the linear correlation between dependent and independent variables and detect multicollinearity problems when independent variables are strongly correlated with each other. The closer the correlation coefficient is to 1 or -1, the stronger the correlation between the two variables, and the closer it gets to 0, the weaker the correlation between the two variables.

#### 3.3.3.3. Multivariate regression analysis

##### **Perform OLS analysis, then test the model's defects through the following assumptions:**

##### *(1) Assuming that the variance of the error is constant:*

When performing multivariable linear regression, the assumption is to assume that the variance of the error does not change. If variance occurs, the results of the regression equation will be inaccurate and reduce the quality of the linear regression model.

To evaluate whether the regression model violates this assumption, the research team relies on the Scatter Plot plot between the normalized residuals and the normalized prediction value as in the assumption of a linear relationship. If the percentiles are fairly uniformly distributed above and below the zero axis, then as X increases or decreases, it is reasonable to assume that the variance of the error is constant.

##### *(2) Assumptions about the model's normal distribution*

The distributive property of residuals is a sufficient condition to determine the significance level of P-value in statistical tests: T-test, F-test. There are two methods used to test the assumption about the normal distribution of the residuals: the graph method and the arithmetic test method. The research team used the method to test the assumption of the normal distribution of the residuals.

##### *(3) Assume no correlation between residuals*

The research team used Durbin - Watson test to check the autocorrelation problem. Durbin Watson test (Durbin Watson test) is a statistical test performed to find the correlation between residuals or errors after estimating the regression test equation from the observation results about independent and dependent variables. To simplify, the research team used the empirical Durbin-Watson test rule.

- If  $1 < d < 3$ , the model has no autocorrelation.
- If  $0 < d < 1$ , the model has positive autocorrelation.
- If  $3 < d < 4$ , the model has negative autocorrelation.

##### *(4) Assume there is no correlation between the variables (no multicollinearity)*

“Linear correlation between two variables is a correlation where when representing the observed values of two variables on the Oxy plane, the data points tend to form a straight line.” According to Gayen (1951), “in statistics, researchers use the Pearson correlation coefficient (symbol r) to quantify the closeness of the linear relationship between two quantitative variables. If either or both variables are not quantitative variables (qualitative variables, binary variables, etc.), we will not perform Pearson correlation analysis for these variables.” The Pearson correlation coefficient r ranges from -1 to 1:

- “If r gets closer to 1, -1: the stronger the linear correlation, the closer it is. Moving towards 1 is a positive correlation, and moving to -1 is a negative correlation.
- If r gets closer to 0, the linear correlation is weaker.
- If r = 1: absolute linear correlation, when represented on a scatter plot, the points represented will merge into a straight line.
- If r = 0: there is no linear correlation. At this point, there will be two situations. One, there is no relationship between the two variables. Second, there is a nonlinear relationship between them.

If the model encounters violations according to the above assumptions, the OLS regression model is not suitable.

### 3.4. Research Process

Step 1: This study explores and synthesizes foreign and domestic research related to the topic “the impact of financial indicators on Earnings management”. Define the scope, audience and objectives of the research paper.

Step 2: Overview of theoretical bases and background theories related to the concept, classification, techniques and motives of Earnings management, theories related to financial indicators and their impact on Earnings management profit.

Step 3: Determine the research model and the scale for the research variables based on the results of the two steps above.

Step 4: Collect data from companies listed on the Vietnam stock market through 2 websites: <https://cafef.vn> and <https://www.cophieu68.vn>. Perform statistics to test the model and research hypotheses.

Step 5: Analyze the statistical results, draw conclusions and make recommendations to stakeholders in determining, evaluating and controlling the management’s profit on the financial statements

## 4. RESULTS AND DISCUSSION

### 4.1. Research results

#### 4.1.1. Descriptive statistical analysis results

**Table 4.1 Descriptive statistics of independent variables**

		Statistics						
		ROE	ROA	don bay	cotuc	benvung	size	DA
N	Valid	866	866	866	866	947	866	865
	Missing	179	179	179	179	98	179	180
Mean		,0938	,0592	1,305	-,07077	,0782	9,5335	,0000
Std. Deviation		,3788	,1456	1,533	4,6389	,3778	3,1007	,5925
Minimum		-8,661	-1,779	,003	-88,941	-8,661	4,200	-7,3249
Maximum		3,081	2,959	17,820	42,605	3,371	13,491	6,4681

The average level of Earnings management is 0, the highest is 6,468, and the lowest is -7.325. The average ROE is 0.094, the highest is 3.081, and the lowest is -8.661. The average ROA is 0.059, the highest is 2.959, and the lowest is -1.779. The average L/E leverage is 1.305, the highest is 17.82, and the lowest is 0.003. The average dividend payout ratio is -0.071, the highest is 42,695, and the lowest is -88,941. The average sustainable development rate is 0.078, the highest is 3,371, and the lowest is -8.661. The average company size is 9,533, the highest is 13,491, and the lowest is 4.2.



## 4.1.2. Correlation analysis results

Table 4.2 Correlation matrix between variables

		Correlations						
		ROE	ROA	donbay	cotuc	benvung	size	DA
ROE	Pearson Correlation	1	,597**	-,370**	,009	,968**	,030	,057
	Sig. (2-tailed)		,000	,000	,802	,000	,375	,096
	N	866	866	866	866	866	866	865
ROA	Pearson Correlation	,597**	1	-,190**	,009	,613**	-,054	,049
	Sig. (2-tailed)	,000		,000	,785	,000	,115	,148
	N	866	866	866	866	866	866	865
donbay	Pearson Correlation	-,370**	-,190**	1	,032	-,381**	,07	,045
	Sig. (2-tailed)	,000	,000		,354	,000	,023	,182
	N	866	866	866	866	866	866	865
cotuc	Pearson Correlation	,009	,009	,032	1	-,043	,18	,031
	Sig. (2-tailed)	,802	,785	,354		,209	,000	,361
	N	866	866	866	866	866	866	865
ben vung	Pearson Correlation	,968**	,613**	-,381*	-,043	1	-,10	,045
	Sig. (2-tailed)	,000	,000	,000	,209		,00	,191
	N	866	866	866	866	947	866	865
size	Pearson Correlation	,030	-,054	,077*	,18	-,104**	1	,062
	Sig. (2-tailed)	,375	,115	,023	,000	,002		,068
	N	866	866	866	866	866	866	865
DA	Pearson Correlation	,057	,049	,045	,031	,045	,062	1
	Sig. (2-tailed)	,096	,148	,182	,361	,191	,068	
	N	865	865	865	865	865	865	865

\*\* . Correlation is significant at the 0.01 level (2-tailed).  
\* . Correlation is significant at the 0.05 level (2-tailed).

The research team considers the correlation between the variables to serve as a basis for regression analysis and to identify and eliminate variables where multicollinearity occurs.

The analysis results show that the Pearson correlation coefficient between the variables is relatively low (less than 0.6), so multicollinearity is very unlikely.

## 4.1.3. Results of regression analysis

## 4.1.3.1. Table ANOVA

Table 4.3 Results of ANOVA. analysis

		ANOVA <sup>a</sup>				
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2,525	2	1,262	3,617	,027 <sup>b</sup>
	Residual	300,861	862	,349		
	Total	303,386	864			

a. Dependent Variable: DA
b. Predictors: (Constant), donbay, ROE

In order to assess the fit of the regression model, the research team used the F test to test the hypothesis  $H_0: R^2 = 0$ . The results show that

$Sig = 0.027 < 0.05$ : Reject hypothesis  $H_0$ ; that is,  $R^2 \neq 0$  statistically significant, and the regression model is suitable.

4.1.3.2. Table Model Summary

**Table 4.4 Model Summary Analysis Results**

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin- Watson
1	,091 <sup>a</sup>	,008	,006	,59078514	1,895
a. Predictors: (Constant), donbay, ROE					
b. Dependent Variable: DA					

The measure of the fit of the linear regression model commonly used is the coefficient of determination  $R^2$  (R square). When most of the data points are concentrated close to the regression line, the  $R^2$  value will be high; if the data points are scattered far away from the regression line,  $R^2$  will be low.

The results from the Model Summary Table show R Square and Adjusted R Square to assess model fit. Adjusted R Square = 0.006 shows that the independent variables selected for regression analysis affect 0.6% of the variation of the dependent variable, the remaining 99.4% due to out-of-model variables and random error.

Durbin-Waston d-test value:  $d=1.895$ . Since  $1 < d < 3$ , the model does not have autocorrelation.

4.1.3.3. Table Coefficients

**Table 4.5 Coefficients. analysis results**

Coefficients <sup>a</sup>								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-,051	,029		- 1,766	,078		
	ROE	,133	,057	,085	2,332	,020	,862	1,160
	donbay	,030	,014	,077	2,110	,035	,862	1,160
a. Dependent Variable: DA								

The research team used the t-test (student) to evaluate whether the regression coefficients of the independent variables were significant in the model or not. Hypothesis  $H_0$ : The regression coefficient of the independent variable  $X_i$  is 0. Test results:

After removing the variables with Sig value  $> 0.05$  and running the model again, the remaining two variables ROE and donbay, had Sig  $< 0.05$  (SigROE = 0.02; Sigdonbay = 0.035), so the research team rejected the hypothesis. Theory  $H_0$ , that is, the regression coefficients of the ROE and donbay variables are statistically different from zero in the model, and the variables ROE and donbay affect the dependent variable.

Based on the regression coefficients in the table, the research team has built a standardized regression equation:

$$DA = 0,085 \times ROE + 0,077 \times donbay + \varepsilon$$

The regression results show that when ROE increases to 8.5%, Earnings management will increase to a new level (excluding the impact of financial leverage). When financial leverage L/E increases to 7.7%, Earnings management will increase to a new level (excluding the impact of ROE).

**4.1.3.4. Variance magnification factor VIF**

**Table 4.5 Coefficients . analysis results**

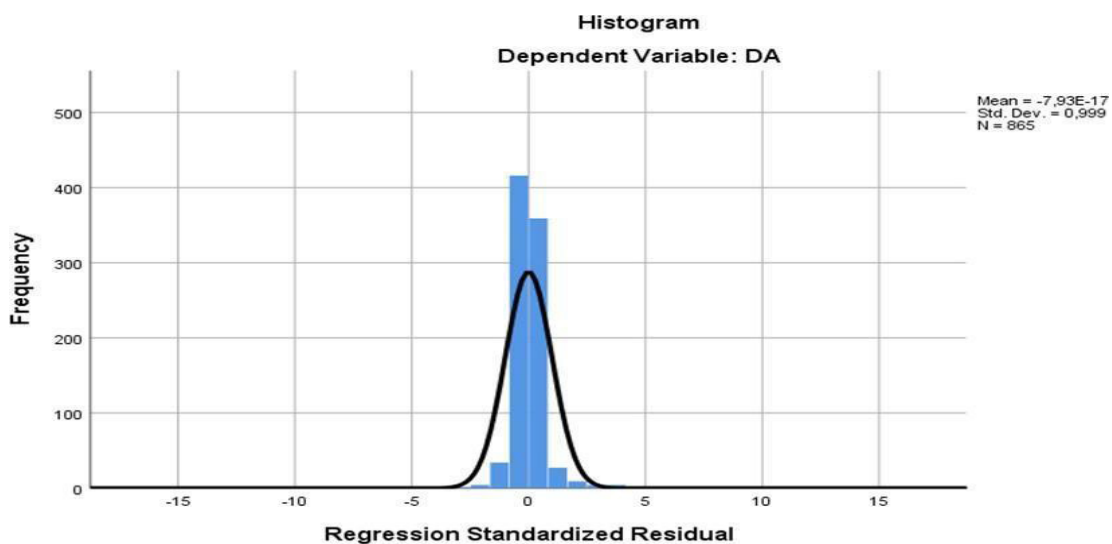
Coefficients <sup>a</sup>								
Model	B	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		Std. Error	Beta				VIF	
1	(Constant)	-,051	,029		-1,766	,078		
	ROE	,133	,057	,085	2,332	,020	,862	1,160
	donbay	,030	,014	,077	2,110	,035	,862	1,160

a. Dependent Variable: DA

“VIF is an index to evaluate the phenomenon of collinearity in the regression model. The smaller the VIF, the less likely there is to be multicollinearity. Conversely, when the VIF is large (greater than 10), the possibility of multicollinearity is very high.” (Pham Loc, 2022)

In the analysis results table, the VIF coefficients of the independent variables are all less than 2, so the data does not violate the multicollinearity assumption.

**4.1.3.5. Histogram. Normalized Residual Frequency Histogram**

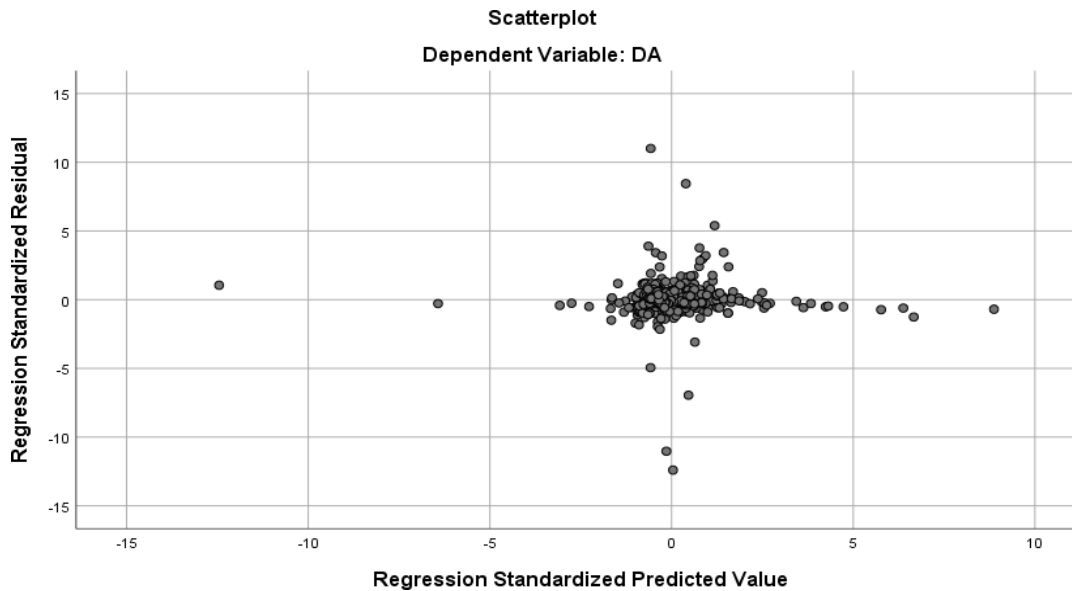


**Figure 4.1 Histogram. Normalized Residual Frequency Histogram**

From the results of the graph, we see that Mean ≈ 0, standard deviation Std. Dev ≈ 1, the value columns of the residuals have a bell-shaped distribution, so the distribution is approximately normal, from

which the research team concludes that the assumption of the normal distribution of the residuals is not violated. In the model, Mean =  $-7,93E - 17 \approx 0$ , standard deviation is  $0,999 \approx 1$

**4.1.3.6. Biểu đồ Scatter Plot kiểm tra giả định liên hệ tuyến tính**



**Figure 4.2 Scatter Plot**

If the distribution data points are concentrated around the zero coordinate line and tend to form a straight line, although it is not clear because the mining data set is the resource index, it is mainly differentiated from 0 to 1. In this case, the research team accepts that the assumption of a linear relationship is not violated.

**4.2. Results of the discussion**

The results show that out of 6 independent variables included in the model, there are two variables that affect earnings management. Both ROE and donbay variables have a positive impact on earnings management.

Table 4.6 Summary of hypothesis testing results

Hypothesis	Content	Expected	Regression results
H1	The more “financial leverage” the company uses, the higher the level of earnings management.	+	+
H2	The higher the “return on total assets”, the lower the ability to manage profits	-	0
H3	The larger the “company size”, the higher the ability to manage profits.	+	0
H4	The higher the “sustainable growth rate”, the higher the ability to manage profits	+	0
H5	The higher the “return on equity” the better the ability to manage profits	+	+
H6	The higher the “dividend payout ratio”, the higher the ability to manage profits	+	0

The model test results support hypothesis H1 and H5, and no statistical relationship is found in hypotheses H2, H3, H4, H6.

With the results supporting the hypothesis H1 and H5, the experimental data model results show that in the period from 2017 to 2021:

- The higher the “financial leverage” (L/E), the higher the level of Earnings management.
- The higher the ROE, the higher the level of Earnings management.

Based on the signal theory, the research team makes a judgment on hypothesis H1 that the more leverage the company uses, the higher the level of earnings management. The research results show that the above statement is appropriate, and the test results are consistent with the research hypothesis. This result is also supported by previous studies of (Sadeghi & Zareie, 2015), (Tran Thi Thuy Kieu, 2021). This proves that in the period from 2017 to 2021, companies on the stock exchange in Vietnam tend to implement earnings management through the use of debt instruments (leverage index  $L/E$ ).

Based on the theory of signals and the theory of agency, the research team makes a statement about hypothesis H5 that the higher the return on equity, the higher the level of earnings management. The research results show that the above statement is appropriate, and the test results are consistent with the research hypothesis. This result is also supported by previous studies of (Sadeghi & Zareie, 2015), (Nguyen Thi Phuong Hong, 2016), (Nguyen Thi Thanh Ha, 2017). This proves that in the period from 2017 to 2021, companies on the stock exchange in Vietnam tend to implement Earnings management through the use of ROE.

## 5. CONCLUSION

The research results from the model show that from 6 independent variables selected: Return on capital (ROE), Return on total assets (ROA), Liabilities to equity (donbay), Payout ratio dividend (cotuc), sustainable growth rate (benvung), company size (size). There are two variables that have a positive impact on the level of earnings management: Return on capital (ROE) and Liabilities on equity (donbay).

The study has achieved the objective of identifying financial indicators that affect Earnings management and the extent of influence on Earnings management of companies on the Vietnam stock exchange. There are two variables that have a positive impact on the level of Earnings management: Return on capital (ROE) and Liabilities on equity (donbay).

Thus, compared with previous studies in Vietnam on the impact of financial indicators on earnings management, by expanding the observational data on HOSE from 2017 to 2021, the results showed that only The amount of leverage ( $L/E$ ) affects Earnings management

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## THE FINANCIAL CONTAGION EFFECTS OF THE GLOBAL COVID-19 PANDEMIC: EVIDENCE FROM FINTECH AND TRADITIONAL FINANCIAL MARKETS

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**ABSTRACT:** *In this, we investigate the contagion effect of the global Covid-19 pandemic in terms of the shift in mean spillover, volatility spillover, and time-varying correlation between Asian emerging stock and Bitcoin, as well as between stock and altcoins. The tri-variate GARCH-BEKK models are estimated, which include Covid-19 related dummies corresponding to the Covid-19 arrival date, the panic index, the media hype index, and the sentiment index. The time-varying correlation obtained through the DCC-GARCH model between two markets is under investigation to examine the transmission mechanism of the contagion effect and the safe-haven properties of Bitcoin and altcoins during various contexts of the Covid-19 pandemic. Our results indicate that both Bitcoin and altcoin cannot serve as a safe haven against Asian emerging stock markets in most contexts of this rapidly escalating pandemic, as we find evidence of the presence of a contagion effect, both in terms of a shift in mean spillover, volatility spillover, and dynamic correlation, between Asian emerging stock markets and cryptocurrency markets since the appearance of the Covid-19 pandemic. Especially, this contagion effect becomes more obvious in the high panic period, the high media hype period, and the negative market sentiment period. Additionally, we also provide evidence in support of the investor-induced contagion hypo during various turmoil context of the Covid-19 pandemic. We find that the source of the contagion effect between the stock market and the cryptocurrency market is the wealth effect. Furthermore, there is heterogeneity among the bitcoin and altcoin markets in how the global Covid-19 pandemic affected their respective relationship with the Asian emerging stock market.*

**Keywords:** *Covid-19 pandemic, fintech, Bitcoin, altcoin, financial markets*

### 1. INTRODUCTION

In recent years, trade barriers and restrictions on international capital flow have been gradually removed. In addition, the scope and scale of information technology have expanded dramatically, thus encouraging the globalization of the traditional financial market, such as stocks, bonds, and foreign exchanges. This phenomenon has contributed to greater global financial integration and provided investors, corporations, and economies with a wide range of opportunities and strategic benefits. However, extraordinary financial integration is usually associated with an increasing volatility spillover and a financial contagion effect, thus increasing the vulnerability of the investor to systematic risk arising from domestic or global factors (Ahmed, 2021a), especially during crisis or uncertainty periods.

The financial technology (Fintech) and its integration with traditional financial market have attracted the interest of policy makers, researchers, financial institutions, and investors around the world. According to Chen et al. (2019), cybersecurity, mobile transactions, data analytics, blockchain, peer-to-peer (P2P), robo-advising and the internet of things (IoT) are the seven subcategories that can be used to categorize fintech. The dramatic surge of interest in FinTech over the past few years has highlighted the need for a better understanding of the implications of FinTech in various aspects of the financial system. Our

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study contributes to the knowledge of blockchain-related aspects of fintech and contributes to the body of knowledge on asset diversification by taking into account the investment capabilities of cryptocurrencies, including Bitcoin and altcoins, and their connections to traditional markets.

The topic's specific objectives are as follows:

i. Examine the safe haven properties of cryptocurrencies against Asian emerging stock markets during various contexts of the Covid-19 pandemic.

ii. Examine the existence of the contagion effect between the cryptocurrency markets and the Asian emerging stock markets during various turmoil periods of the Covid-19 pandemic.

iii. Verify whether the contagion effect between the Asian emerging stock market and the cryptocurrency market sources from the wealth effect or portfolio rebalancing mechanism.

iv. Test whether there is a heterogeneity among the bitcoin and altcoin markets in how the global Covid-19 pandemic affected their respective relationship with the Asian emerging stock market.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Literature on the connectedness between Bitcoin, altcoins, and other financial markets**

Cryptocurrency assets appear to be a potentially attractive investment asset from the perspective of portfolio diversification due to their low connection with traditional financial assets, their capacity to store value, and their independence from monetary policy. (Colon et al., 2021; Shahzad et al., 2021), hence, cryptocurrencies can take the role of a hedge, safe haven, or diversifier in the investors' portfolio and can be included in the variety of tools available to investors to hedge some of the market-specific risk. There are two main streams of research on the interconnectedness between cryptocurrencies and other financial markets. The first stream of interest focuses on modelling the relationship between cryptocurrencies and other traditional financial assets such as bonds, stocks, foreign exchange, or commodities, etc., and attempt to analyze their correlation as well as the return spillover and volatility spillover aspect. The second stream of interest focuses on the potential shift in the linkage or transmission mechanism between cryptocurrencies and other traditional markets during turmoil periods and examines the question of whether the relationship between cryptocurrencies and other mainstream assets changes over time. These are useful factors that can help investors, portfolio managers, and financial institutions make decisions about portfolio allocation, risk management, and hedging strategies.

### **2.2. The Interdependence between Bitcoin, altcoins, and traditional financial markets**

Corbet et al. (2018) employed the generalized decomposition methodology to examine the spillover of return and volatility in three popular cryptocurrencies, namely Bitcoin, Ripple, and Litecoin, and a variety of other financial assets. The results indicated that these three cryptocurrencies are isolated from other traditional assets such as gold, stock, or bond indices, thus providing short- and long-term investors with opportunities for diversification. Guesmi et al. (2019) used the DCC-GARCH model to identify the conditional cross effect and volatility spillover between Bitcoin and other mainstream financial tools and indicate that Bitcoin offers a low correlation with financial assets. Giudici & Abu-Hashish (2019) reached a similar conclusion, which confirms that Bitcoin could offer diversification and hedging benefits for financial investors. Furthermore, using an ADCC model and a non-temporal test, Urquhart & Zhang (2019) demonstrated that Bitcoin can be used as an intraday hedge tool for the CHF, EUR and GBP, but also as a diversifier for the AUD, CAD, and JPY and as a safe haven for the CAD, CHF, and GBP. The diversification benefits of cryptocurrencies for traditional financial assets such as stock, bond, currency, oil, gold, etc.



can be explained by Ciaian et al. (2016) 's finding that long-term fluctuations in the price of bitcoin are unrelated to macroeconomic and financial developments on a global scale and are instead largely influenced by supply/demand dynamics in the bitcoin market, as well as characteristics unique to digital currencies, such as the currency's appeal to investors.

### 3. RESEARCH METHOD

#### 3.1. Data set

The GARCH model was estimated for two biggest market capitalizations of cryptocurrencies, namely Bitcoin and Ethereum, which represent the altcoin market; and 8 Asian emerging stock indices: China (SSEC), Thailand (SETI), Philippines (PSEI), Indonesia (JKSE), India (S&P BSE100), Taiwan (TSE 50), Malaysia (KLSE), and Parkistan (KSE 100).

#### 3.2. Models for testing the hypotheses

##### 3.2.1. Hypotheses tested for the safe haven properties of Bitcoin and Altcoins

Hypo 1: Bitcoin does not provide safe haven properties against Asian emerging stock markets during various contexts of the Covid-19 pandemic.

Hypo 2: Ethereum does not provide safe haven properties against Asian emerging stock markets during various contexts of the Covid-19 pandemic.

##### 3.2.2. Hypo tested for the contagion effect between the the cryptocurrency market and the the stock market

We employ two different methodologies to estimate the contagion effect and to gauge the transmission mechanism of the contagion effect between the stock market and the cryptocurrency market. First, research developed the BEKK-GARCH model to test these hypotheses based on previous studies by Caporale et al. (2021). The second methodology is based on the DCC-GARCH model to test for the contagion effect, as proposed by Rigobon (2003, 2019). These two models are given to analyze the existence of a contagion effect between bitcoin/ethereum and Asian emerging stock markets in the context of the global Covid-19 pandemic.

##### 3.2.3. Hypo tested for the transmission mechanism of the contagion effect between the the cryptocurrency market and the the stock market

Hypo 5: Investor-induced contagion effect between Asian emerging stock market and Bitcoin market sources from the wealth effect mechanism

If contagion effect between Bitcoin and Asian emerging stock markets speard by investor wealth constraints rather than by the need for portfolio rebalancing, the dynamic correlation between these two markets is higher during turmoil periods than during tranquil periods. To test that there is a significant increase in correlation between stock and Bitcoin during the turmoil periods, the null hypo is for no contagion:

$H_{0,5}$ : The dynamic correlation between the stock and Bitcoin during turbulent periods related to the Covid-19 pandemic is equal to its correlation in the calm period:

$H_{1,5}$ : The dynamic correlation between the stock and Bitcoin during turbulent periods related to the Covid-19 pandemic is higher than its correlation in the calm period:  $\rho_{13c} > \rho_{13nc}$

Hypo 6: Investor-induced contagion effect between Asian emerging stock market and Bitcoin market sources from the portfolio rebalancing mechanism

If contagion effect between Bitcoin and Asian emerging stock markets speard by portfolio rebalancing

channel, the dynamic correlation between these two markets is lower during turmoil periods than tranquil periods, that is,

$H_{0.6}$ : The dynamic correlation between the stock and Bitcoin during turbulent periods related to the Covid-19 pandemic is equal to its correlation in the calm period:  $\rho_{13c} = \rho_{13nc}$

$H_{1.6}$ : The dynamic correlation between the stock and Bitcoin during turbulent periods related to the Covid-19 pandemic is lower than its correlation in the calm period:  $\rho_{13c} < \rho_{13nc}$

Hypo 7: Investor-induced contagion effect between Asian emerging stock market and altcoin market sources from the wealth effect mechanism

In a similar spirit, to examine whether the wealth effect is the transmission mechanism of the contagion effect between stock markets and altcoin markets during Covid-19 turmoil periods, we use t-tests to evaluate whether there is a significant increase in the dynamic correlation between stock and altcoin as follows:

$H_{0.7}$ : The correlation between stock and altcoin during the turbulent period related to the Covid-19 pandemic is equal to its correlation in the tranquil period.  $\rho_{23c} = \rho_{23nc}$

$H_{1.7}$ : The correlation between stock and altcoin during turbulent periods related to the Covid-19 pandemic is higher than its correlation in the tranquil period.  $\rho_{23c} > \rho_{23nc}$  If the null hypotheses  $H_{0.7}$  are rejected, we conclude that the investor-induced contagion effect between Asian emerging stock market and altcoin market sources from the wealth effect mechanism

Hypo 8: Investor-induced contagion effect between Asian emerging stock market and altcoin market sources from the portfolio rebalancing mechanism

$H_{0.8}$ : The dynamic correlation between the stock and altcoin during turbulent periods related to the Covid-19 pandemic is equal to its correlation in the calm period:  $\rho_{23c} = \rho_{23nc}$

$H_{1.8}$ : The dynamic correlation between the stock and altcoin during turbulent periods related to the Covid-19 pandemic is lower than its correlation in the calm period:  $\rho_{23c} < \rho_{23nc}$

## 4. RESULTS AND DISCUSSION

### 4.1. Descriptive statistical analysis

**Table 4.1: Descriptive statistics of Return Series (Full sample)**

	Obs.	Mean	Std	Min	Max	Skew	Kurtosis	Jarque-Bera	M.ARCH	ADF
RBIT	1464	0.321	4.758	-50.423	23.812	-0.857	11.472	8206.700		-39.7092***
RETH	1464	0.557	7.173	-58.627	49.145	0.029	7.374	3316.700		-38.0220***
RSSEC	1464	0.004	1.109	-8.039	5.554	-0.980	7.652	3805.800	246.94***	-40.3350***
RSETI	1464	0.013	0.994	-11.428	7.653	-1.994	28.493	50492.800	263.61***	-41.0384***
RPSEI	1464	-0.005	1.260	-14.322	7.172	-1.461	17.920	20109.500	164.38***	-39.4777***
RJKSE	1464	0.021	0.993	-6.805	9.704	-0.090	11.173	7617.300	232.41***	-36.1949***
RBSE	1464	0.051	1.105	-13.881	8.143	-1.743	25.869	41563.100	206.14***	-39.1462***
RTSE	1464	0.056	1.019	-6.637	6.943	-0.245	5.357	1765.200	401.89***	-38.6262***
KLSE	1464	-0.006	0.694	-5.405	6.626	-0.293	12.220	9130.350	992.74***	-32.7252***
KSE 100	1464	0.024	1.106	-7.102	4.684	-0.623	4.786	1492.125	162.83***	-32.9234***

## 4.2. The hedge and safe haven properties of Bitcoin

**Table 4.2: Testing for safe haven properties of Ethereum**

	China	Thailand	Philippines	Indonesia	India	Taiwan	Malaysia	Pakistan
Panel A: ETH-Stock (Dummy: DCOV)								
$m_0$	0.043***	0.113***	0.057***	0.047***	0.035***	0.020***	0.007***	-0.010***
$m_1$	0.000	0.004	0.001	0.002***	0.021***	0.011***	-0.000	0.002**
Panel B: ETH-Stock (Dummy: DPI)								
$m_0$	0.044***	0.094***	0.055***	0.048***	0.049***	0.031***	0.007***	-0.012***
$m_1$	0.000	0.071***	0.013***	0.006**	0.018**	0.003*	-0.002	0.012***
Panel C: ETH-Stock (Dummy: DMHI)								
$m_0$	0.044***	0.100***	0.057***	0.052***	0.055***	0.028***	0.006***	-0.008***
$m_1$	0.000	0.034***	0.003	-0.004*	0.004	0.007***	0.000	0.001
Panel D: ETH-Stock (Dummy: DSI)								
$m_0$	0.044***	0.087***	0.051***	0.047***	0.054***	0.030***	0.009***	-0.010***
$m_1$	0.000	0.039***	0.008	0.003	0.003	0.003**	-0.003	0.005*

Notes: Rejection of the null at the 1%, 5%, and 10% level is denoted by \*\*\*, \*\*, and \*

Source: Own Processing

We next analyse other turmoil periods within the Covid time to provide more detail on the hedge and safe haven ability of Ethereum. The result reconfirms that Ethereum does not provide hedge or safe haven properties for all Asian emerging stock markets, as the constant  $m_0$  shows a positive relationship between Ethereum and stock indices in most Asian emerging countries with significance at the 1% level and the coefficient  $m_1$  is positive significant or insignificant together with a positive value of sum parameters in most countries during the high panic, high media hype, or negative sentiment periods. Except for the case of Pakistan, in more extreme market conditions of the Covid-19 pandemic where the panic index or the media hype index is high or the sentiment index turns negative after the appearance of the Covid-19 pandemic, Ethereum remains a strong hedge property for the Pakistan stock market; however, it cannot be considered as a safe haven for KSE 100 during the high panic period and the negative sentiment period. The insignificant coefficients  $m_1$  together with a negative value of sum parameters in the context of the high media hype period in Pakistan show that Ethereum can only provide a weak safe haven effect for the Pakistan stock market during the high media hype period. In general, Ethereum does not provide a hedge or safe haven property for Asian emerging stock markets in almost times of extreme market conditions related to the Covid-19 pandemic.

## 4.2. Empirical results on the contagion effect

### 4.2.1. Contagion effect in terms of a change in time-varying correlation

**Table 4.3: T-test for DCC of Bitcoin-Stock pair**

	China	Thailand	Philippines	Indonesia	India	Taiwan	Malaysia	Pakistan
Panel A: Pre-Covid and Covid Periods								
Mean DCC in tranquil period	-0.0039	0.1026	0.0492	0.0309	0.0597	-0.0220	0.0130	-0.0127
Mean DCC in turmoil period	0.0251	0.1039	0.0541	0.0357	0.0731	0.0324	0.0123	0.0011
Different in Mean DCC	0.0290	0.0014	0.0049	0.0048	0.0134	0.0544	-0.0007	0.0138
Reject $H_0$ :	***		*	***	***	***		***
Panel B: Low and high panic periods								

Mean DCC in tranquil period	0.0124	0.0903	0.0474	0.0329	0.0676	0.0285	0.0129	-0.0084
Mean DCC in turmoil period	0.0475	0.1332	0.0706	0.0424	0.0801	0.0404	0.0111	0.0214
Different in Mean DCC	0.0351	0.0430	0.0232	0.0094	0.0124	0.0118	-0.0018	0.0299
Reject Ho:	***	***	***	*	*			***
Panel C: Low and High-Media Hype Periods								
Mean DCC in tranquil period	-0.0016	0.0979	0.0533	0.0422	0.0737	0.0255	0.0124	-0.0078
Mean DCC in turmoil period	0.0525	0.1098	0.0550	0.0293	0.0724	0.0397	0.0123	0.0104
Different in Mean DCC	0.0542	0.0119	0.0017	-0.0129	-0.0013	0.0142	-0.0001	0.0183
Reject Ho:	***			**				***
Panel D: Positive and Negative Sentiment Periods								
Mean DCC in tranquil period	0.0148	0.0728	0.0376	0.0280	0.0740	0.0374	0.0129	-0.0129
Mean DCC in turmoil period	0.0279	0.1128	0.0564	0.0390	0.0730	0.0296	0.0122	0.0151
Different in Mean DCC	0.0131	0.0400	0.0189	0.0111	-0.0010	-0.0078	-0.0008	0.0279
Reject Ho:	*	***		*				***

Note: The mean of pairwise conditional correlations between Bitcoin and stock ( $\rho_{13}$ ) for sub-samples in tranquil periods is reported in Mean DCC in tranquil period, whereas the mean of pairwise conditional correlation for subsample in turmoil period is reported in Mean DCC in turmoil period. The difference in DCC is calculated from the mean of the turmoil period minus the mean of the tranquil period. The null hypo of equal correlation means between DCC in a tranquil period and DCC in a tranquil period is tested (H0: Correlation in turmoil period = correlation in tranquil period) against the alternative (H1: Correlation in turmoil period  $\neq$  Correlation in tranquil period). The rejection of the level of null at the 1%, 5%, and 10% is indicated by \*\*\*, \*\*, and \* respectively.

The estimated time-varying correlation between the Asian emerging stock market and the Ethereum market is, on average, higher during the Covid period than during the pre-Covid period in seven out of eight nations of the sample (Table 4.3) . This difference is statistically significant in five cases, including the Philippines, Indonesia, India, Taiwan and Pakistan. A comparison of three subperiods suggests that statistically significant increase in time-varying correlation between stock and Ethereum during turbulence periods related to the Covid-19 pandemic has become more common in the high panic period and negative sentiment period, which were rare during high media hype period. To be more specific, the significant increase in conditional correlation between Ethereum and stock is recognized in six out of eight countries (except China and Malaysia) during high panic period, five out of eight countries (except China, India and Malaysia) during negative sentiment period, whereas only two out of eight countries (Thailand and Taiwan) during high media hype period.

#### 4.2.2. Contagion effect in terms of a change in mean spillover and volatility spillover

To test the adequacy of the models, we perform multivariate generalizations of the Ljung-Box Q to test serial correlation in the mean of standardized residuals and a test for multivariate ARCH effects of standardized residuals. The Ljung-Box Q test of 10 lags rejects the null hypo of no serial correlation in the standardized residual in only three cases. The test for multivariate ARCH effects cannot reject the null hypo that standardized residual series are mean zero, not serially correlated, and with a fixed covariance matrix in all estimated models. Therefore, the residuals of the multivariate model are serially uncorrelated and show no remaining ARCH effects. Overall, the findings show that all estimated models fairly accurately reflect the evolution of conditional means and variances of stock and cryptocurrency returns, as well as their interactions using the selected specification VAR-GARCH(1,1).

**Table 4.4: Parameter estimates for the mean and variance equations: Full period\_Dummy: DCOV**

	China	Thailand	Philippines	Indonesia	India	Taiwan	Malaysia	Pakistan
Conditional Mean Equation								
$\beta_{11}$	0.032	0.057**	0.022	0.046*	0.043	0.053*	0.041*	0.022
$\beta_{13}$	0.185**	0.349***	-0.082	0.206**	0.240**	0.387***	0.449**	-0.251**
$\beta_{13d}$	-0.101	-0.164	0.388**	-0.066	-0.520***	-0.448**	-0.754**	-0.118
$\beta_{22}$	0.045	0.048*	0.064**	0.047*	0.046*	0.050*	0.058***	0.062**
$\beta_{23}$	0.095	0.610***	-0.073	0.386***	0.260	0.560***	0.691**	-0.148
$\beta_{23d}$	0.147	-0.255	0.393*	-0.304*	-0.472*	-0.401	-0.843**	-0.087
$\beta_{33}$	-0.031	0.045	-0.023	0.009	0.063**	0.004	0.027	0.181***
$\beta_{33d}$	0.088	-0.085	0.007	-0.076	-0.064	-0.049	-0.117**	-0.044
Conditional Variance Equation								
a31	0.276***	0.215**	-0.342***	-0.226*	0.332***	0.169	-0.611***	0.099
a31d	-0.005	-0.018**	0.078***	0.030	0.034**	0.054**	0.029*	0.056***
g31	-0.052**	-0.025	-0.401***	0.139	-0.042	-0.068	-0.115**	-0.197***
g31d	0.013	0.007	-0.002	-0.003	0.000	0.002	-0.004	-0.051**
a32	0.125	0.203	-0.399***	-0.267*	0.422***	-0.053	-0.729***	0.063
a32d	-0.015*	0.010	0.001	-0.036	0.000	-0.031	-0.033*	0.019
g32	-0.006	-0.024	-0.460***	0.186	-0.046	-0.065	-0.143**	-0.254***
g32d	-0.002	-0.005	-0.000	0.000	0.001	0.011	-0.003	-0.008
LB(10)	105.7946**	89.71746	113.3651**	104.1119**	116.1965***	107.5923**	102.8849*	139.6687***
ARCH	26.8	32.56	32.11	47.17	30.45	44.45	55.81**	28.68
Obs.	1463	1463	1463	1463	1463	1463	1463	1463

Notes: \*\*\*, \*\*, and \* denote significance at levels of 1%, 5%, and 10%. Standard errors (not reported) are calculated using the quasi-ML method of Bollerslev & Wooldridge (1992), which is robust to the distribution of the underlying residulas. LB(10) indicates the Ljung-Box autocorrelation test for ten lags in the standardized residual. ARCH indicates the multivariate ARCH effects test in the standardized residual. The full set of results is available upon request.

For the full sample period with a dummy DCOV (Table 4.4), the following points are noteworthy. The parameter estimates for the conditional means of eight Asian emerging countries in the full sample period suggest a statistically positive significant spillover in mean from the stock markets to the Bitcoin market for six countries, except for the Philippines and Pakistan. Similarly, the estimation parameters of the spillover mean from the stock markets to the Ethereum market are positive and significant for six countries, except for the case of the Philippines and Pakistan. Furthermore, the Covid-19 pandemic has been found to affect the dynamic links between the Asian emerging stock market and the cryptocurrency market, as indicated by the significant parameters measuring the change in mean spillover from stock to Bitcoin and from stock to Ethereum. In particular, there is a downward shift in the parameter that measures the mean spillover effect (negative contagion) from stock to Bitcoin in seven countries in which three out of them, including India, Taiwan, and Malaysia ( $\beta_{13d} = -0.520$ ;  $-0.448$ ; and  $-0.754$  respectively) are significantly at the 1% and 5% level, and from stock to Ethereum in six countries in which three countries including Indonesia, India, and Malaysia are significant at 5% and 10% level ( $\beta_{23d} = 0.304$ ;  $-0.472$ ; and  $-0.843$  respectively). Therefore, there is evidence of contagion effect in terms of a shift in mean spillover during Covid time from stock to Bitcoin in India, Taiwan, and Malaysia and from stock to Ethereum in Indonesia, India and

Malaysia. This finding suggests that investors in these countries react to the Covid-19 turmoil period by diversifying; therefore, they prefer to reduce the relative proportion of cryptocurrencies compared to stock in their portfolio. Except for the case of the Philippines, the parameter estimates for the shift in mean spillover from stock to Bitcoin and from stock to Ethereum in Covid period are positively significant ( $\beta_{13d} = 0.388$ ;  $\beta_{23d} = 0.393$ ), which may indicate that Philippines’s investors considered stock and digital currency as diversified assets, and classify them in risky asset classes, thus, in turmoil period, investors may choose to reduce investment propotion of these two assets in their portfolio and move to other less-risky assets.

**Table 4.5: Parameter estimates for the mean and variance equations: Covid-19 period\_Dummy: DPI**

Variable	China	Thailand	Philippines	Indonesia	India	Taiwan	Malaysia	Pakistan
Conditional Mean Equation								
$\beta_{11}$	0.027	0.089*	0.080***	0.081	0.070**	0.071	0.092***	-0.019
$\beta_{13}$	-0.153	-0.002	0.220***	-0.153	-0.126***	0.159	-0.178	-0.031
$\beta_{13d}$	0.050	0.076	0.191***	0.393	-0.282***	0.089	0.183	0.168***
$\beta_{22}$	-0.320***	-0.195***	-0.193***	-0.190***	-0.029	-0.183***	-0.197***	-0.024
$\beta_{23}$	0.117	-0.042	0.365***	-0.245	-0.308***	0.338	-0.172	0.228***
$\beta_{23d}$	-0.263	0.397**	0.069	0.541	-0.033***	0.180	0.458**	0.114***
$\beta_{33}$	0.085	0.034	-0.029	-0.035	-0.078	0.046	-0.044***	0.027
$\beta_{33d}$	-0.081	0.034	0.013	0.191**	0.074	-0.205***	-0.096***	0.191***
Conditional Variance Equation								
a31	-0.092	0.420***	0.379***	0.324*	0.614***	0.103	-0.162	0.614***
a31d	-0.006	-0.051***	-0.041***	-0.184***	-0.007***	0.034*	-0.175***	0.061***
g31	-1.652***	-0.307***	-0.161***	-0.183	-0.067***	-0.551***	-0.627***	-0.061
g31d	0.177***	-0.000	0.047***	0.042**	-0.023***	-0.093***	0.264***	-0.107***
a32	-0.165	0.657***	0.286***	0.318	0.697***	0.007	-0.041	0.654***
a32d	-0.003	0.007**	0.012***	0.126**	0.009***	-0.087***	0.111***	-0.010**
g32	-2.163***	0.090**	-0.046	-0.052	-0.128***	-0.907***	-0.503***	-0.320***
g32d	0.181***	-0.007	-0.010	-0.057***	0.005	0.176***	-0.326***	0.005
LB(10)	102.3659*	89.57754	85.33966	92.69314	112.9707**	93.78464	86.40925	110.9842**
ARCH	14.31	13.94	16.12	18.42	17.58	24.4	13.67	16.42
Obs.	415	407	401	379	401	407	404	382

Notes: \*\*\*, \*\*, and \* denote significance at levels of 1%, 5%, and 10%. Standard errors (not reported) are calculated using the quasi-ML method of Bollerslev & Wooldridge (1992) , which is robust to the distribution of the underlying residulas. LB(10) indicates the Ljung-Box autocorrelation test for ten lags in the standardized residual. ARCH indicates the multivariate ARCH effects test in the standardized residual. The full set of results is available upon request.

Table 4.5 represents the estimated result when the Panic index indicator is included in the model for the Covid-19 subsample. The estimated parameters of the mean spillover from the stock to Bitcoin are positively significant for the Philipines ( $\beta_{13} = 0.220$ ); and negatively significant for India ( $\beta_{13} = -0.126$ ). Additionally, estimates of the mean spillover from stocks to Ethereum are negative and significant for India ( $\beta_{23} = -0.308$ ) and positive significant for the Philippines and Pakistan ( $\beta_{23} = 0.365$ ; and 0.228 respectively). In particular, on days when the panic index is high, there is a significant and upward shift in the parameter that represents the spillover in mean running from stock to Bitcoin in Philippin and Pakistan ( $\beta_{13d} = 0.191$ ; and 0.168 respectively); and from stock to Ethereum in Thailand, Malaysia and Pakistan ( $\beta_{23d} = 0.397$ ; 0.458 and 0.114 respectively). Furthermore, downward shifts in the mean spillover parameter from stock to Bitcoin have been observed in India ( $\beta_{13d} = -0.282$ ); and from stock to Ethereum in India ( $\beta_{23d} = -0.033$ )

have been observed. For Korea and Thailand, the spillover in the mean from the Pakistan stock market to the Bitcoin market, as well as the spillover in the mean from the Thailand stock market and Malaysia to the Ethereum market was only recognized in a high panic period during Covid time.

Table 4.6 represents the estimated result when the Media Hype index indicator is included in the model for the Covid-19 subsample. The estimated parameters of the mean spillover from the stock market to the Bitcoin market are positive and significant for Thailand, the Philippines and Taiwan ( $\beta_{13} = 0.555$ ; 0.174 and 0.300, respectively); and negative and significant for India ( $\beta_{13} = -0.132$ ). Furthermore, the estimated parameters of the mean spillover from Asian stock to Ethereum are positively significant for Thailand and Taiwan ( $\beta_{23} = 0.612$  and 0.235 respectively); and negatively significant for India and Pakistan ( $\beta_{23} = -0.465$  and -0.875). In the high media hype period, there is a negative contagion in the mean run from stock to Bitcoin in Thailand, India, and Taiwan ( $\beta_{13d} = -0.742$ ; -0.165; and -0.494, respectively); and from stock to Ethereum in Thailand and Taiwan ( $\beta_{23d} = -0.705$ ; and -0.374, respectively). Furthermore, there is a positive contagion in the mean movement of the stock to Bitcoin in Pakistan ( $\beta_{13d} = 0.329$ ) and from stock to Ethereum in three countries, including Philippines, India and Pakistan ( $\beta_{23d} = 0.411$ ; 0.294 and 1.146, respectively).

**Table 4.6: Parameter estimates for the mean and variance equations: Covid-19 period\_Dummy: DMHI**

	China	Thailand	Philippines	Indonesia	India	Taiwan	Malaysia	Pakistan
Conditional Mean Equation								
$\beta_{11}$	-0.002	0.129***	0.025	0.069	0.089***	0.044	0.119***	-0.001
$\beta_{13}$	-0.037	0.555***	0.174***	-0.132	-0.132***	0.300***	-0.147	-0.256
$\beta_{13d}$	-0.075	-0.742***	0.031	0.372	-0.165***	-0.494***	-0.150	0.329**
$\beta_{22}$	-0.206**	-0.187***	-0.137***	-0.193**	-0.086***	-0.126***	-0.245***	-0.110*
$\beta_{23}$	-0.266	0.612***	-0.080	-0.420	-0.465***	0.235*	-0.117	-0.875***
$\beta_{23d}$	0.248	-0.705***	0.411***	0.662	0.294***	-0.374**	0.037	1.146***
$\beta_{33}$	0.104	0.066	0.036	-0.012	-0.015***	0.036*	-0.143***	0.069
$\beta_{33d}$	-0.150	-0.157**	-0.091	-0.006	-0.054***	-0.121***	0.116**	0.047
Conditional Variance Equation								
a31	-0.528**	0.480***	0.750***	0.942***	0.656***	1.421***	-0.018	-0.160**
a31d	0.000	0.035***	0.006***	0.075	-0.027***	-0.043***	0.057***	0.059***
g31	0.493***	-0.201***	-0.139***	-0.151	-0.092***	-1.200***	-0.039	0.576***
g31d	-0.159***	-0.041***	-0.041***	-0.093*	-0.003***	0.165***	-0.223***	-0.143***
a32	-0.648**	0.640***	0.826***	1.252***	0.722***	1.520***	-0.146	-0.430***
a32d	-0.001	-0.001	0.008***	-0.086*	0.032***	-0.010*	-0.027***	0.019***
g32	0.349**	-0.210***	-0.154***	-0.271**	-0.209***	-1.287***	-0.239	0.774***
g32d	0.064*	-0.024***	-0.032***	0.031	0.003***	0.116***	0.255***	-0.065***
LB(10)	91.84266	95.43953	84.17832	93.26921	113.6645***	93.821	82.82145	99.6125*
ARCH	9.95	21.45	23.57	22.33	18.72	19.41	11.01	19.92
Obs.	415	407	401	379	401	407	404	382

Notes: \*\*\*, \*\*, and \* denote significance at levels of 1%, 5%, and 10%. Standard errors (not reported) are calculated using the quasi-ML method of Bollerslev & Wooldridge (1992), which is robust to the distribution of the underlying residuals. LB(10) indicates the Ljung-Box autocorrelation test for ten lags in the standardized residual. ARCH indicates the multivariate ARCH effects test in the standardized residual. The full set of results is available upon request.

Source: Own Processing

**Table 4.7: Parameter estimates for the mean and variance equations: Covid-19 period\_Dummy: DSI**

	China	Thailand	Philippines	Indonesia	India	Taiwan	Malaysia	Pakistan
Conditional Mean Equation								
$\beta_{11}$	0.010	0.052*	0.056*	0.110***	0.026	0.027	0.064	0.008
$\beta_{13}$	-0.204	-0.025	0.821***	-0.011	0.604***	0.094	-0.151	0.330**
$\beta_{13d}$	0.150	0.224***	-0.483***	-0.364***	-0.959***	-0.182	-0.085	-0.547***
$\beta_{22}$	-0.109**	-0.152***	-0.195***	-0.249***	-0.130***	-0.096	-0.209**	-0.008
$\beta_{23}$	0.226	0.477***	3.731***	-0.589***	2.046***	-0.034	-0.111	0.449**
$\beta_{23d}$	-0.073	-0.231***	-3.244***	0.292***	-2.401***	0.286	-0.072	-0.541***
$\beta_{33}$	-0.285***	0.031	0.505***	0.178***	0.273***	-0.103	0.008	0.142**
$\beta_{33d}$	0.335***	-0.046**	-0.521***	-0.290***	-0.337***	0.094	-0.047	-0.042
Conditional Variance Equation								
a31	-0.118***	-0.032	0.369***	0.320***	0.718***	0.717***	-0.551	0.148***
a31d	-0.006***	-0.064***	-0.001***	0.111***	0.045***	0.014	0.047***	-0.008**
g31	0.060**	-0.109***	-0.028	0.394***	-0.126***	-0.440**	3.245***	0.200***
g31d	0.250***	0.019***	-0.064***	-0.036***	0.000	0.003	-0.216***	0.013
a32	-0.099**	0.003	0.451***	0.241***	1.111***	0.767***	-0.743*	-0.243***
a32d	-0.000*	-0.012***	0.001	0.116***	-0.015***	-0.006	-0.107***	-0.007
g32	0.596***	0.163***	-0.030	0.626***	0.098***	-0.816***	3.531***	0.056
g32d	-0.022***	-0.006**	0.007*	-0.005*	-0.004	0.074	0.454***	0.034***
LB(10)	95.43038	88.93854	95.38577	113.4837**	99.74783*	90.68579	75.49016	108.1858**
ARCH	16.44	19.07	29.14	19.5	22.38	21.25	16.98	17.01
Obs.	415	407	401	379	401	407	404	382

Notes: \*\*\*, \*\*, and \* denote significance at levels of 1%, 5%, and 10%. Standard errors (not reported) are calculated using the quasi-ML method of Bollerslev & Wooldridge (1992) , which is robust to the distribution of the underlying residulas. LB(10) indicates the Ljung-Box autocorrelation test for ten lags in the standardized residual. ARCH indicates the multivariate ARCH effects test in the standardized residual. The full set of results is available upon request.

Source: Own Processing

Table 4.7 represents the estimated parameter values when the dummy that represents the negative sentiment period is included in the model for the Covid-19 subsample. The estimated parameters of the mean spillover from the stock to Bitcoin are positive and significant for the Philippines, India and Pakistan ( $\beta_{13} = 0.821$ ; 0.604 and 0.330, respectively). The estimated parameters of the mean spillover from Asian stocks to Ethereum are positively significant for 5 Asian countries, including Thailand, Philippines, India and Pakistan ( $\beta_{23} = 0.477$ ; 3.731; 2.046 and 0.449 respectively); and negatively significant for Indonesia ( $\beta_{23} = -0.589$ ). In the negative sentiment period, there is a negative contagion in the mean running from the stock to Bitcoin in the Philippines, Indonesia, India and Pakistan ( $\beta_{13d} = -0.483$ ; -0.364; -0.959; and -0.547 respectively); and from the stock to Ethereum in Thailand, Phillipines, India, and Pakistan ( $\beta_{23d} = -0.231$ ; -3.244; -2.401 and -0.541, respectively). There is a positive contagion in the mean flow from stock to Bitcoin in Thailand ( $\beta_{13d} = 0.224$ ); and from stock to Ethereum in Indonesia ( $\beta_{23d} = 0.292$ ).



### 4.3. The transmission mechanism of the contagion effect between the stock market and the cryptocurrency market during the Covid-19 period

We extract the dynamic correlation for each pair of assets using the standardized residual return produced by the DCC-GARCH model for the pair of Bitcoin-stock and Ethereum-stock. During both turmoil and tranquil periods related to the Covid-19 outbreak, we examine the investor-induced contagion hypo and assess whether this contagion impact is caused by the wealth effect or the portfolio rebalancing effect. As proposed by Boyer et al. (2006) and Petmezas & Santamaria (2014), for investor-induced contagion to hold through the wealth effect hypo, Bitcoin-stock correlation ( $\rho_{13}$ ) or Ethereum-stock correlation ( $\rho_{23}$ ) must increase in turmoil periods. In contrast, for investor-induced contagion sourced by the portfolio rebalancing to hold, these correlation must reduce in turmoil periods.

**Table 4.8: T-test for the contagion channel between the Ethereum market and the Stock market**

	China	Thailand	Philippines	Indonesia	India	Taiwan	Malaysia	Pakistan
Panel A: Pre-Covid and Covid Period								
Mean DCC in tranquil period	0.0439	0.1137	0.0573	0.0478	0.0359	0.0204	0.0070	-0.0110
Mean DCC in turmoil period	0.0446	0.1177	0.0592	0.0503	0.0579	0.0324	0.0070	-0.0082
Different in Mean DCC	0.0007	0.0041	0.0019	0.0024	0.0219	0.0119	-0.0001	0.0027
Reject Ho ( $\rho_{23c} > \rho_{23nc}$ )			*	***	***	***		***
Reject Ho ( $\rho_{23c} < \rho_{23nc}$ )								
Panel B: Low and high panic periods								
Mean DCC in tranquil period	0.0444	0.0949	0.0553	0.0484	0.0498	0.0312	0.0077	-0.0122
Mean DCC in turmoil period	0.0448	0.1665	0.0688	0.0546	0.0682	0.0347	0.0052	0.0002
Different in Mean DCC	0.0005	0.0716	0.0135	0.0062	0.0184	0.0035	-0.0025	0.0124
Reject Ho ( $\rho_{23c} > \rho_{23nc}$ )		***	***	**	**	**		***
Reject Ho ( $\rho_{23c} < \rho_{23nc}$ )								
Panel C: Low and High-Media Hype Period								
Mean DCC in tranquil period	0.0442	0.1004	0.0576	0.0526	0.0557	0.0290	0.0066	-0.0089
Mean DCC in turmoil period	0.0449	0.1344	0.0612	0.0479	0.0603	0.0360	0.0075	-0.0076
Different in Mean DCC	0.0007	0.0340	0.0036	-0.0047	0.0046	0.0070	0.0009	0.0013
Reject Ho ( $\rho_{23c} > \rho_{23nc}$ )		***				***		
Reject Ho ( $\rho_{23c} < \rho_{23nc}$ )				**				
Panel D: Positive and Negative Sentiment Periods								
Mean DCC in tranquil period	0.0440	0.0870	0.0516	0.0477	0.0549	0.0300	0.0097	-0.0109
Mean DCC in turmoil period	0.0447	0.1264	0.0603	0.0514	0.0580	0.0337	0.0060	-0.0055
Different in Mean DCC	0.0006	0.0394	0.0086	0.0036	0.0031	0.0037	-0.0037	0.0054
Reject Ho ( $\rho_{23c} > \rho_{23nc}$ )		***	*	*		**		**
Reject Ho ( $\rho_{23c} < \rho_{23nc}$ )								

Note: The mean of pairwise conditional correlations between Ethereum and stock ( $\rho_{23}$ ) for sub-samples in tranquil periods are reported in mean DCC in tranquil period, whereas the mean of pairwise conditional correlation for sub-sample in turmoil period are reported in mean DCC in turmoil period. The difference in DCC is calculated from the mean of the turmoil period minus the mean of the tranquil period. The first null hypo of equal correlation means among DCC in tranquil period and DCC in tranquil period is tested (H0: Correlation in turmoil period = correlation in tranquil period) against the alternative (H1: Correlation

in turmoil period > Correlation in tranquil period). The second null hypo of equal correlation means among DCC in tranquil period and DCC in tranquil period is tested ( $H_0$ : Correlation in turmoil period = correlation in tranquil period) against the alternative ( $H_1$ : Correlation in the turmoil period < Correlation in the tranquil period). Rejection of the null at the 1%, 5%, and 10% level is denoted by \*\*\*, \*\*, and \* respectively.

To take into account that the transmission mechanism between Asian merging stock market and Ethereum market may vary over time, Table 4.13 represents the result of the T-test for testing the investor induced contagion between Asian stock market and Ethereum market sourced by the wealth effect and portfolio rebalancing hypo, respectively. The results of the T test indicate that the significant increase in the dynamic correlation between stock and Ethereum in turmoil periods is recognized in 5 countries (except China, Thailand, and Malaysia) during the Covid period, 6 countries (except China and Malaysia) during the high media hype period, 2 countries including Thailand and Taiwan during the high media hype period and 5 countries (except China, India, and Malaysia) in the negative sentiment period. The volatile nature of DCC between stock and Ethereum estimates, especially during various turmoil contexts in the global Covid-19 pandemic, suggests that the transmission mechanism of the contagion effect between stock market and Ethereum market is through the wealth effect in most cases. The change in the correlation between the Indonesia stock market and the Ethereum market can be considered as an exception as it decreases significantly during the high media hype period. Therefore, for this specific case, the contagion effect is the result of a portfolio rebalancing effect.

## 5. CONCLUSIONS

The Covid-19 pandemic has wreaked havoc on economies around the world and has had a significant impact on the global financial market. The global health crisis affects not only country-specific risk, but also systemic risk, which is why its impact on the linkage between financial assets has piqued the interest of economists, investors, and policy makers. Financial markets around the world have responded to the global spread of the Covid-19 pandemic by increasing risk and changing cross-market links, and emerging Asian stock markets and cryptocurrency markets are no exception.

In this study, we analyze both the presence of the contagion effect and the transmission mechanism that causes contagion between the emerging Asian stock market and the Bitcoin and altcoin market under various turbulent periods related to the Covid-19 pandemic. This is necessary to understand the shift in mean spillover, volatility spillover, and dynamic correlation between traditional equity markets and cryptocurrency markets, which represent, for the Fintech revolution, during the turbulent periods of Covid-19. It can also provide an explanation for the volatility of digital currencies, which has recently puzzled both academic researchers and investors. Furthermore, our research aims to complement the results of previous studies on the benefits of hedge, safe haven, and diversifier of cryptocurrency by assessing whether Bitcoin and Ethereum can be used as hedge, safe haven, or diversifier against emerging Asian stocks, in the different contexts of the global health crisis, and conditional on relevant Covid new-related indicators.

According to the literature, assets become more connected during economic downturns. The global Covid 19 pandemic offers an unprecedented opportunity to further explore this consideration (Bekaert et al., 2009; Hartmann et al., 2004; Lee et al., 2011). Recently, the role of cryptocurrencies, including Bitcoin and altcoins, as an investment shelter during a market crash such as the global Covid-19 pandemic has been recognized in academia. There is a stream of research that argues that cryptocurrencies failed to prove their hedging and safe haven probability during the Covid-19 pandemic (Dutta et al., 2020; Lahmiri & Bekiros, 2020; K. Q. Nguyen et al., 2021; Yarovaya et al., 2021). Therefore, from the financial asset perspective, cryptocurrencies have not

yet demonstrated their safe haven capability during any large-effect economic crisis and recession (Conlon & McGee, 2020; Corbet, Larkin et al., 2020a, 2020b). Other studies support the argument that bitcoin and altcoins can be considered a safe haven for financial assets in the context of the Covid-19 pandemic (Corbet et al., 2021; Diniz-Maganini et al., 2021; Goodell & Goutte, 2021; Huang et al., 2021). This research is different from previous investigations, as we examine the present of the contagion effect as a shift in return spillover, volatility spillover, and time-varying correlation from the Asian emerging stock market to the cryptocurrencies market in the context of the Covid-19 global pandemic.

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## ANALYSIS OF FACTORS INFLUENCING INVESTMENT DECISIONS IN THE VIETNAMESE STOCK MARKET OF STUDENTS IN HO CHI MINH CITY

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**ABSTRACT:** *The Vietnamese stock market has experienced significant growth, attracting individual investors, including young students. This study examines the factors influencing investment decisions among Vietnamese students in the stock market, using SPSS 20.0 software to evaluate the reliability of measurement scales and to test the accuracy of the model. Through surveys and statistical analysis, the results of the study showed that factors including overconfidence, herd behavior, risk attitude, firm image, accounting information, neutral information, advocate information and personal financial needs had a positive impact on the investment decisions of Vietnamese students in the stock market. The research also indicates the level of investment and the intentions of students in investing in the Vietnamese stock market. The research provides insights for academic and practical purposes, benefiting students, businesses, and government agencies. Practical solutions are proposed to enhance investment decisions, market stability, and attract investment for listed companies on the stock exchange.*

**Keywords:** *stock market, investment decision, financial behavior.*

### 1. INTRODUCTION

In the past two decades, the Vietnam stock market has experienced remarkable growth, with securities trading accounts surging from 400 at its launch in July 2000 to 4,946,316 accounts as of March 31, 2022. This surge highlights the market's appeal as a significant investment channel, especially for individual investors. While the market still exhibits characteristics of a developing market, Vietnam has been steadily integrating into the global economy. The stock market serves as a vital component of the Vietnamese economy, mobilizing medium and long-term capital for economic growth. The rapid development of the Vietnam stock market has garnered attention both regionally and globally. Notably, the stock market in Vietnam has experienced robust growth. Data from the State Securities Committee shows a significant increase in mobilized capital. For instance, mobilized capital rose from 40 trillion VND in 2006 to 320 trillion VND in 2019. Even in the challenging first half of 2020, the stock market mobilized approximately 107 VND. Despite obstacles, such as oil price fluctuations and supply chain disruptions in the supply chain due to conflicts between Russia and Ukraine, the Vietnamese stock market demonstrated relatively high growth.

The main challenge for individual investors in the stock market is the potential risks associated with investing. These risks make decision-making and timing of investments difficult. Factors like financial influences and investor behaviors have a significant impact on investment decisions. Limited knowledge, skills, and experience pose additional challenges for students, who are known for their dynamism and adaptability. Limited capital can lead to a cautious mentality, fear of risks, and a tendency to follow the majority for safety. Therefore, it is crucial for individual investors to carefully evaluate market factors and understand the overall market situation. This analysis is essential for managers in developing strategies to attract and restore the Vietnamese stock market.

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Understanding investor psychology and conducting research on factors influencing investment decisions, particularly among students, is crucial for businesses in today's global landscape. The Behavioral Finance Theory by Victor Ricciardi & Helen K. Simon (2000) examines how behavioral finance affects the investment decisions of individual investors. Another study by Hussein A. Hassan Al-Tamimi (2005) explores factors influencing investment decisions in the UAE's financial market, which can be relevant to Vietnam's stock market. Empirical research in Vietnam, across various sectors and the economy, has identified financial factors impacting investment decisions on the HOSE Stock Exchange. For instance, Nguyen Thi Ngoc Diep and Nguyen Minh Kieu found that expected profit, dividend policy, dividend payout ratio, and stock price significantly influence individual investors' decisions, with the dividend payout ratio having the greatest impact. Proposed solutions aim to enhance investors' decision-making abilities and assist businesses in attracting investments. Nguyen Thi Mai's research on behavioral factors during COVID-19 in the Vietnamese stock market shows that demographic characteristics and the pandemic have significant influences. Factors such as investment experience, age, and education level positively impact investment decisions, while gender does not play a significant role. The study also highlights the presence of emotional decision-making, herd mentality, and overreactions, potentially influenced by the pandemic and market changes. This research has implications for enhancing investment performance and understanding investor psychology for securities companies in Vietnam. However, research on the specific topic of financial factors and behavior's impact on individual investors' decisions remains limited in Vietnam.

In summary, identifying the factors that impact investment decisions is of utmost importance in the current economic situation in Vietnam. Therefore, our research team has undertaken a study titled "Analysis of factors influencing investment decisions in the Vietnamese stock market of students in Ho Chi Minh City". The primary objective of this study is to analyze and understand the factors influencing investment decisions of students in Ho Chi Minh City when participating in the Vietnamese stock market. By identifying these factors and assessing the level of impact of these factors, we aim to propose solutions to enhance students' investment decision-making abilities, attract investments for businesses, and provide recommendations for government support.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Definition**

#### **2.1.1. Individual investors**

Individual investors are individuals who participate in investment activities across different market segments to achieve desired benefits. Specifically, individual investors are investors who buy and sell securities for their own accounts through traditional or online brokerage firms or other types of investment accounts (Hayes, 2020). Their involvement is crucial for exploring investment opportunities, supporting business development, and driving economic and social progress in any economy (Guo et al., 2017)

#### **2.1.2. Investment decision**

Investment is the allocation of resources for medium or long-term purposes with the expected effectiveness of recovering investment costs and achieving high profits. While making decisions, we are influenced by various factors and change our behavior. This also occurs in the decision-making process of investors (Akbar et al., 2016). In reality, the financial decisions of investors are influenced by internal and external behavioral factors, and research on financial behavior has developed rapidly in recent years (Shefrin, 2000; Wärneryd, 2001).

## **2.2. Factors affecting the investment decision of individual investors**

### **2.2.1. Overconfident**

Numerous studies, including Trivers (1991), have highlighted how people tend to be overconfident, overestimating their abilities and exaggerating their knowledge. This behavior is particularly prevalent in stock investing, where overconfident investors often misjudge information accuracy and misinterpret its meaning due to cognitive limitations. Overconfidence leads to higher risk-taking as investors concentrate on familiar stocks and rarely diversify (Campbell et al., 2004; Lichtenstein et al., 1982). Consequently, overconfident investors trade more frequently and achieve lower average returns (Oden, 1999). Overconfidence also often underestimates the volatility of risky assets or overestimates their accuracy (Baker & 11 Nofsinger, 2011). While overconfidence can boost certain aspects of professional performance and enhance advancement opportunities (Oberlechner & Osler, 2004), it remains a human characteristic rather than a market characteristic (Oden, 1998). Market efficiency is influenced by various participants, leading to excessive trust and overconfidence among investors (Waweru et al., 2008). Even if you are a good analyst, it does not mean you will be a successful trader.

### **2.2.2. Herd behavior**

The herd behavior in financial markets is defined as the behavioral trend of investors following the actions of others (Bikhchandani and Sharma, 2001; Banerjee, 1992). Based on the observed actions of others, individuals generate their own behaviors, or in other words, imitate the actions of others (Hwang and Salmon, 2004). The herd behavior can create market inefficiency and speculative bubbles. In general, investors who follow the herd behavior behave like prehistoric humans, who have some knowledge and information about their environment and are grouped to support each other and achieve safety (Carporelli et al., 2004, p. 223). Investors who follow herd behavior aim to minimize perceived risks, especially when investing significant capital. Additionally, the herd behavior also depends on the types of investors, for example, individual investors tend to follow the herd behavior more in making investment decisions than organized investors (Goodfellow, Bohl & Genka, 2004, p. 213). It is important to note that the prevalence of herd behavior may differ between individual and institutional investors (Goodfellow, Bohl & Genka, 2004).

### **2.2.3. Risk attitude**

Researchers now focus on the risk attitude of individual investors alongside fundamental and technical analysis to understand their stock trading behavior. Risk and uncertainty influence crucial economic decisions, emphasizing the need to understand and predict economic behavior. Risk is an unwanted outcome associated with uncertainty, making stocks riskier due to market volatility. Nowadays, the stock market always has its ups and downs. This makes stocks riskier, and volatility is measured in very precise ways (such as variance, standard deviation, and beta (Ly, 2010)). Prospect theory is often used to explain investors' risk attitudes. Weber, Blais, and Betz (2002), who support prospect theory, show that people are risk-seeking when facing losses. Risk attitudes depend on factors like age, income, gender, education, and experience

### **2.2.4. Firm image**

The firm image plays a crucial role in understanding how a company achieves its goals and objectives, impacting the investment decisions of individual investors. Numerous studies, such as Robert A. Nagy and Robert W. Obenberger [21, p. 67] (1994) and Al-Tamimi (2006) in the UAE, have demonstrated the positive influence of firm image on stock investment decisions. Epstein's (1994) research also revealed that companies with a strong image in terms of culture, reputation, product quality, and social responsibility positively affect individual investors' choices. Furthermore, the research model by Le Hoang Anh, Nguyen

Ho Phuong Thao, and Phan Thi Nhu Hieu highlights that firm image has the greatest impact on investment decisions of individual investors in the stock market of Hue city.

#### **2.2.5. Accounting information**

Before making investment decisions, investors usually pay attention to accounting information such as the ability to sell stocks, expected earnings, financial reports, dividends, stock prices, expected dividends, and past stock information (Hussein, 2006). And if a company discloses complete accounting information, individual investors will have more confidence in the company, and investment trends will be higher (A. Nagy & W. Obenberger, 1994).

#### **2.2.6. Advocate information**

For new investors entering the stock market, who have little experience and time to keep up with the daily volatility of the stock market, using a brokerage and advisory services is entirely reasonable, especially for students. According to the AL - Anood Bin Kalli's research, opinions from advisors affect the investment decisions of individual investors, including: advice from brokers; opinions from family members; opinions from colleagues, and friends; opinions from shareholders in the company; advice from market analysts, finance (Al-Tamimi & Kalli, 2009). However, Nagy and Obenberger (1994) believed that recommendations from brokers, individual brokers, family members, or colleagues are rarely taken into account. In addition, religious reasons, recommendations on "opinions and supporters" are socialpsychological factors of the market that have little influence on investors' decisionmaking (AL - Tamimi, 2006; Sultana and Pardhasaradhi, 2012; Chong and Lai, 2011; Merikas et al., 2011) but in the views of Hussein A. Hassan AL - Tamimi and Anood Bin Kalli, 2009 are the opposite, the authors believe that religion has a significant influence on investment decisions in the UAE and rumors have the least influence. In addition, recommendations from supporters such as brokerage firms, friends, and acquaintances are considered the most influential factor in the study of investor behavior in Malaysia (Chong and Lai, 2011). According to Nilsson (2008), Riedl and Smeets (2017), and Gutsche et al. (2019), relatives' knowledge and advice can positively impact individual investment decisions by sharing insights about popular stocks and future investment portfolios. Therefore, interactions between family members, acquaintances, and friends can be an important source of information for individuals before making investment decisions (Hong et al., 2004; Gutsche & Zwergel, 2020).

#### **2.2.7. Neutral information**

Information that investors can search and refer to on stock forums, from the media, and from securities company reports before making investment decisions is called neutral information. The factors of neutral information prioritized when making trading decisions: the volatility of the stock index, news from forums, the media, and from government decisions and announcements, economic indicators (GDP, interest rates, etc.), the market price of listed securities, and the percentage of state-owned shares held (A. Hassan Al-Tamimi & Kalli, 2009). According to Aamir Sarwar & Ghadeer Afaf (2016), factors related to neutral information such as information about price volatility mean the change or fluctuation in price due to the difference between supply and demand on a trading day. When searching for information about market fluctuations, news in the press, information from the Internet, recent price changes, and information about government holders are important for investors (Shafi, 2014). Other studies such as Robert A. Nagy and Robert W. Obenberger (1994), Hussein A. Hassan Al-Tamimi (2006) also confirmed that this neutral information directly affects investment decisions. Therefore, investors will not make investment decisions without market-supported information sources.

### **2.2.8. Personal financial needs**

One of the desires of investors when investing in the stock market is to benefit from the price difference of stocks. At the same time, investors also aim to profit from dividends, unlike the benefit from price differences which can only be realized at the maturity date and only a certain percentage is received. The need for financial investment among investor groups by age is not the same and varies with each stage of age. For young investors, the stock market is a suitable investment channel with flexible initial capital according to each person's financial capacity. At the same time, young investors have more time to learn, make mistakes and correct losses. Therefore, they can accept higher risks to achieve their goals (in terms of knowledge or finance). Conversely, for older investors, they tend to seek stable investment opportunities with low risk. They are afraid when faced with high risks as time does not allow them to correct their mistakes as desired. The study by Robert A. Nagy and Robert W. Obenberger (1994) identified 6 component factors within the group of personal financial factors. The attractiveness of other investment markets including: Necessary diversification; low risk; expectation of failure in international financial markets; comfort with credit funds; expectation of failure in domestic financial markets.

## **3. RESEARCH METHOD**

### **3.1. Sampling**

According to the research by Hair et al. (2006), to conduct exploratory factor analysis (EFA), the minimum sample size should response the formula:  $n \geq 5x$  ( $n$  is the sample size,  $x$  is the number of observed variables - the number of measurement questions in the survey table), the authors developed a model consisting of 39 observed variables, so it is:  $n \geq 5 \times 39 = 195$ . Therefore, the minimum sample size required to ensure the representativeness and accuracy of the research is 195 samples.

### **3.2. Data collection method**

The data was collected in raw form by gathering information on survey forms. The group approached students in Ho Chi Minh City through social media and conducted the survey via a link attached to an online survey developed on the Google Forms. The statistical sampling method Snowball Chain is often used when there is wide distribution and sharing among students and others, helping to save time in data collection and selecting appropriate subjects.

The questionnaire used a Likert scale with a level of agreement ranging from 1 to 5 with specific scores: 1 = "Completely disagree", 2 = "Disagree", 3 = "Neutral", 4 = "Agree", 5 = "Completely agree".

After collecting survey responses, the research data was screened and non-standard responses were eliminated, and processed using SPSS 20.0.

### **3.3. Method to test the Reliability of Variable**

The Cronbach's Alpha coefficient is a statistical test of the degree of consistency among items in a measurement scale (Hoang Trong & Chu Nguyen Mong Ngoc, 2008). This coefficient evaluates the reliability of the measurement scale based on the variance of each observation and the correlation of each variable with the score of the total remaining variables in the measurement (George and Malley, 2003). There are two points to note when analyzing the Cronbach's Alpha coefficient:

First, testing the reliability of the entire measurement scale. According to Nunnally & Bernstein (1994), Cronbach's Alpha coefficient is good if it is from 0.8 to 1, 0.7 to 0.8 is acceptable, while 0.6 to 0.7 is the requirement for new researches. However, if the Cronbach's Alpha coefficient is too high (above 0.95), it indicates that many variables in the measurement scale measure the same concept of the research.



Second, testing the reliability of each observed variable by Corrected Item-total Correlation - which indicates the degree of close relationship between observed variables in the factors and dependent variables. When a measuring variable has a correlation coefficient - total adjusted correlation  $\geq 0.3$ , the variable is satisfactory (Nguyen Dinh Tho, 2013).

### 3.4. Method to test the Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) is a mutually dependent multivariate analysis aimed at reducing a set of interdependent variables into a new set (new factors) with fewer variables to identify the necessary variables for the research problem (Hair et al., 2010). The new set of variables still contains meaningful information and is complete compared to the original set of variables. We will use the Principal Component Analysis and Varimax to group all the factor.

In the EFA method, the criteria for selecting appropriate variables are as follows:

According to Kaiser (1974), the KMO coefficient is an index used to evaluate the suitability of the factor. This coefficient must be  $\geq 0.5$  with Sig.  $\leq 0.05$  significance level.

Factor loading is a coefficient that reflects the correlation between the observed variable and the factor. The higher the factor loading coefficient, the higher the correlation between the observed variable and the factor, and in contrast. If the Factor Loading  $< 0.5$  in EFA, it will be eliminated to ensure the value of the homogeneity coefficient between variables.

Finally, we should ensure that the Total Explained Variance  $\geq 50\%$  and Eigenvalue  $\geq 1$ .

### 3.5. Regression Analysis

Multiple linear regression analysis is an extension of simple linear regression and is used when predicting the value of a dependent variable based on the values of two or more independent variables. All observed variables when analyzing correlation will be analyzed by multiple linear regression according to the regression equation. In this case, we will figure out whether the Investment Decision has a multiple linear relationship with 8 independent variables. The multiple linear regression is shown below:

$$QD = \beta_0 + \beta_1 TT + \beta_2 DD + \beta_3 RR + \beta_4 HA + \beta_5 KT + \beta_6 NI + \beta_7 YK + \beta_8 NC + \varepsilon$$

In which:

Dependent Variable

- QD: Investment decision

Independent Variable

- TT: Overconfidence
- DD: Herd Behavior
- RR: Risk Attitude
- HA: Firm Image
- KT: Accounting Information
- NI: Neutral Information
- YK: Advocate Information
- NC: Personal Financial Needs

In the multiple linear regression analysis, we should follow these criteria:

- Adjusted coefficient of determination (R<sup>2</sup>): This is a measure of the percentage of variation in the dependent variable that is explained by the independent variables, taking into account the sample size and the number of independent variables in the multiple regression model. The higher the R<sup>2</sup> value, the greater the explanatory power of the regression model (Hair et al., 2010). Typically, we choose a mid-range level of 0.5 to 1 as a good model, while a value below 0.5 indicates an inadequate model.

- Independence of residuals: The Durbin-Watson statistic (d) is used to test the autocorrelation of adjacent residuals (first-order autocorrelation). If this statistic is close to 2, the residuals are uncorrelated.
- Test of the significance of regression coefficients  $\beta$  using the t-test in multiple regression to evaluate the importance of factors. The larger the coefficient  $\beta$ , the more important the independent variable is to the dependent variable.
- Significance value (Sig): If the Sig value of the t-test for the regression coefficient of an independent variable is less than 0.05, we conclude that the independent variable has an effect on the dependent variable.
- Variance inflation factor (VIF) in the model: If the VIF of a predictor is greater than 10, the variable has little explanatory value for the variation of the dependent variable in the multiple regression model (Hair & ctg, 2006, cited in Nguyen Dinh Tho, 2012).

### 3.6. Measurement Scale

The model of the research project was developed based on assumptions from 8 main groups of potential factors. The scale of a factor is defined as a set of observable variables that can measure, explain and reflect the characteristics of that factor. In the study, observed variables (scales) were constructed according to the formative construct and measured the degree of agreement based on the 5-point Likert scale.

Based on previous research models, this study base on the model of psychological factors affecting the investment decision of Ho Minh Phuc (2015), retaining three objective factors: Overconfidence, Herd Mentality, and Attitude towards risk. Based on the study of factors influencing individual investors in UAE (Hussein A. Hassan Al-Tamimi, 2006), the group suggested retaining these factors, which is appropriate because there is similarity between the stock markets of Vietnam and UAE (Nguyen Thi Ngoc Diep, 2011).

**Table 3.1: Description of variables in the research model**

Number	Name	Coding	Describe	Expectation	Source
Dependent variable					
1	Investment decision	QD	The commitment to invest in stocks or bonds with the expectation of future profit.”		Hussen A. Hassan Al-Tamimi (2005)
Independent variable					
1	Overconfidence	TT	The psychology in which investors are satisfied with their investment decisions on their own.	+	Waweru et al., 2008
2	Herd Behavior	DD	Investors’ behavior of imitating the majority of other investors.	+	Waweru et al., 2008
3	Risk attitude	RR	Investors’ behavior when an unexpected situation occurs.	+	Waweru et al., 2008
4	Firm image	HA	Analyzing the operations of a company to understand how it achieves its goals and objectives.	+	Waweru et al., 2008
5	Accounting information	KT	The reports provide interested parties with insights into the financial health of the company.	+	Robert A. Nagy and Robert W. Obenberger (1994)
6	Neutral information	NI	The information is publicly posted, easily accessible, and available for reference.	+	Robert A. Nagy and Robert W. Obenberger (1994)
7	Advocale information	YK	Providing knowledge and information from family, relatives, friends, or brokers to facilitate investment decisions that are faster, more accurate, and reduce risk.	+	Al Anood Bin Kalli (2009) Hussen A. Hassan Al-Tamimi (2005)
8	Personal financial needs	NC	Desiring to earn profits from an investor’s investment portfolio.	+	Robert A. Nagy and Robert W. Obenberger (1994)

## 4. RESULTS AND DISCUSSION

### 4.1. Results

The team issued a survey questionnaire via the online Google Form tool for students in various fields in Ho Chi Minh City from March to June 2022. Starting with the question “Have you invested or are you currently investing in the stock market?” to exclude recipients who do not participate in stock market investment. Those who answered “No” were directed to the end of the survey and thanked for their participations. We have collected 300 questionnaires which includes 271 suitable respondents (a response rate of 90%), however, we have already eliminated 17 unsuitable respondents. Therefore, the team collected 254 valid samples and used them for further analysis.

#### 4.1.1. Descriptive statistical analysis

**Table 4.1.1: Descriptive statistics of the surveyers' characteristics**

Feature	Frequency	Percentage
<b>Gender</b>		
Male	144	56.7%
Female	110	43.4%
<b>Major field</b>		
Economy - Society	153	60.2%
Technology - Engineer	83	32.7%
Other	18	7.1%
<b>Acedemic level</b>		
First – year student	20	7.9%
Second – year student	70	27.6%
Third – year student	107	42.1%
Fourth – year student	51	20.1%
Other	6	2.4%
<b>Monthly income</b>		
Under 1.000.000	19	7.5%
From 1.000.000 to 3.000.000	88	34.6%
From 3.000.000 to 5.000.000	108	42.5%
Above 5.000.000	39	15.4%

**Table 4.1.2: Descriptive statistics of the engaging in stock market of the surveyers**

Level of spending on investments	Frequency	Percentage
Under 1.000.000	73	28.7%
From 1.000.000 to 2.000.000	119	46.9%
From 2.000.000 to 3.000.000	42	16.5%
Above 3.000.000	20	7.9%
<b>Time of participation in the stock market</b>		
Above a year	115	45.3%
From 1 to 2 years	87	34.3%
Above 2 years	52	20.5%
<b>Level of understanding of the stock market</b>		
Very bad	14	5.5%
Bad	32	12.6%
Neutral	122	48.0%

Good	56	22.0%
Very good	30	11.8%
<b>Sources of knowledge about the stock market</b>		
Participate in securities courses	91	35.8%
Being trained in school	102	40.2%
Being guided by others	161	63.4%
Self-research	173	68.1%
Reading books	1	0.4%
<b>Intentions of student investors</b>		
Definitely not	8	3.1%
No	28	11.0%
Uncertain	76	29.9%
Yes	70	27.6%
Definitely yes	72	28.3%

**4.1.2. Reliability test using Cronbach's Alpha**

After testing the Cronbach's Alpha for the first round, we decided removing the variable DD4 (to achieve a higher Cronbach's Alpha value) and RR5 (because the item-total correlation coefficient was less than 0.3). Then we conducted the second Cronbach's Alpha reliability test, the results showed that all measurement scales achieved acceptable reliability. Therefore, the remaining 37 variables will be used in the EFA analysis steps.

**Table 4.1.3: Results of the second round of testing of the scales using Cronbach's Alpha.**

Component	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
<b>Overconfidence (TT)</b>	Cronbach's Alpha = .818			
TT1	11.28	6.596	.667	.758
TT2	11.24	7.031	.587	.794
TT3	11.30	6.094	.680	.751
TT4	11.28	6.512	.625	.777
<b>Herd behavior (DD)</b>	Cronbach's Alpha = .838			
DD1	11.67	6.594	.644	.721
DD2	11.69	5.976	.689	.694
DD3	11.67	6.007	.702	.687
<b>Risk attitude (RR)</b>	Cronbach's Alpha = .878			
RR1	15.83	24.979	.569	.547
RR2	15.87	24.867	.616	.538
RR3	15.89	24.355	.597	.533
RR4	15.86	24.384	.585	.551
<b>Firm image (HA)</b>	Cronbach's Alpha = .900			
HA1	19.77	18.675	.755	.878
HA2	19.84	19.493	.711	.885
HA3	19.79	19.105	.748	.880
HA4	19.84	19.319	.706	.886

HA5	19.81	19.405	.698	.887
HA6	19.80	19.057	.751	.879
<b>Accounting information (KT)</b>	Cronbach's Alpha = .887			
KT1	16.13	12.414	.792	.846
KT2	16.16	13.596	.709	.866
KT3	16.17	13.016	.722	.863
KT4	16.20	13.515	.691	.870
<b>Neutral information (NI)</b>	Cronbach's Alpha = .881			
NI1	16.24	11.820	.698	.861
NI2	16.22	11.914	.723	.854
NI3	16.13	11.942	.763	.846
NI4	16.30	11.973	.731	.853
NI5	16.31	12.122	.669	.867
<b>Advocate information (YK)</b>	Cronbach's Alpha = .803			
YK1	7.49	3.974	.651	.729
YK2	7.35	4.093	.641	.739
YK3	7.26	3.867	.655	.724
<b>Personal financial needs (NC)</b>	Cronbach's Alpha = .929			
NC1	15.90	17.159	.820	.912
NC2	15.92	17.380	.819	.912
NC3	15.87	17.255	.801	.916
NC4	15.88	17.203	.820	.912
NC5	15.89	17.524	.810	.914
<b>Decision-making (QD)</b>	Cronbach's Alpha = .883			
QD1	8.24	3.604	.786	.822
QD2	8.22	3.693	.778	.830
QD3	8.24	3.859	.755	.849

#### 4.1.3. Exploratory factor analysis (EFA)

##### 4.1.3.1. EFA analysis for independent variables

**Table 4.1.4: KMO and Bartlett's test results for independent variables**

<b>KMO and Bartlett's Test</b>		
<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</b>		<b>.941</b>
Bartlett's Test of Sphericity	Approx. Chi-Square	5614.343
	df	595
	Sig.	.000

The test results showed that the KMO index is  $0.941 > 0.5$ , so the research data is suitable for conducting factor analysis. Bartlett's test has a result of 5614.343 with a significance level of  $\text{Sig} = 0.000 < 0.05$ . Therefore, the variables are correlated with each other and meet the condition for factor analysis, so the hypothesis that the correlation matrix between variables is uncorrelated is rejected.

**Table 4.1.5: Factor matrix with Principal Varimax method.**

	Factor							
	1	2	3	4	5	6	7	8
HA6	.779							
HA1	.761							
HA3	.724							
HA5	.716							
HA4	.704							
HA2	.683							
NC2		.784						
NC1		.782						
NC3		.772						
NC4		.761						
NC5		.753						
KT1			.809					
KT4			.752					
KT5			.751					
KT3			.737					
KT2			.727					
NI2				.717				
NI3				.695				
NI4				.685				
NI1				.673				
NI5				.613				
RR3					.818			
RR1					.777			
RR4					.754			
RR2					.728			
TT3						.751		
TT1						.750		
TT4						.733		
TT2						.716		
DD3							.743	
DD1							.728	
DD2							.706	
YK3								.784
YK2								.740
YK1								.716
Eigenvalues								1.080
Extraction Sums of Square Loadings								71.632
Extraction Method: Principal Component Analysis								
Rotation Method: Varimax with Kaiser Normalization								
Rotation converged in 7 iterations								

The Principal Components analysis with Varimax rotation shows that the initial 37 observed variables are extracted into 8 meaningful factors that best summarize the information; the Eigenvalue coefficient is  $1.080 > 1$ . The result also indicates that the extracted variance of 71.632% shows that 71.632% of the data variability is explained by 8 factors that comply with the evaluation standard of the factor extraction method.

#### 4.1.3.4. EFA factor analysis for dependent variables

**Table 4.1.6: KMO and Bartlett's test results for dependent variables.**

KMO and Bartlett's		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		<b>.744</b>
Bartlett's Test of Sphericity	Approx. Chi-Square	410.412
	df	3
	Sig.	.000

After conducting EFA, 3 observed variables of the "Investment decision" scale were grouped into 1 factor, and no observed variables were excluded. The EFA test result showed that the KMO coefficient was 0.744, indicating that the research data was suitable for factor analysis. The Bartlett test had a result of 410.412 with a significance level of Sig. = 0.000 < 0.05. Therefore, the variables were correlated with each other and met the conditions for factor analysis, and the hypothesis of the correlation matrix between variables being uncorrelated was rejected.

**Table 4.1.7: Summary table of cumulative variance eigenvalue for dependent variables.**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.431	81.048	81.048	2.431	81.048	81.048
2	.308	10.265	91.312			
3	.261	8.688	100.000			

After conducting the EFA for the dependent variables using Principal Components with Varimax rotation, the results showed that the total extracted variance was nearly 81%, indicating that these 3 factors explain 81% of the variability in the data. The Eigenvalue scores of the factors were high (>1). All observed variables had factor loading scores >0.5.

**Table 4.1.8: Factor matrix of "Investment decision"**

Component	Factor
	1
QD1	.907
QD2	.903
QD3	.891

The results of the analysis of the observed variables are divided into 8 unique factors and 1 dependent factor. Therefore, the results of the EFA factor analysis to determine the factors obtained from the observed variables are consistent with the initial proposed research model.

#### 4.1.4. Linear regression analysis

##### 4.1.4.1. Model fit assessment

**Table 4.1.9: Summary of the regression model**

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup> square	Std. Error Of the Estimate	Durbin - Waston
1	.814 <sup>a</sup>	.662	.651	.55354	2.077
a Predictors: (Constant), NC, TT, KT, YK, RR, HA, DD, NI					
b Dependent Variable: QD					

The adjusted R<sup>2</sup> coefficient has a value of 0.651 > 0.5, meaning that about 65.1% of the variance in investment decisions is explained by 8 independent variables: Overconfidence, Herd behavior, Risk

attitude, Firm image, Accounting information, Neutral information, Advocale information and Personal financial needs. The remaining 34.9% of investment decisions are explained by other factors.

**4.1.4.2. Testing the goodness of fit of the model**

**Table 4.1.10: ANOVA table for testing the goodness of fit of the model.**

Model	Sum of Squares	df	Mean square	F	Sig.
Regression	97.147.132	8	18.391	60.023	.000 <sup>b</sup>
Residual	75.070	245	.306		
Total	222.202	253			
a. Predictors: (Constant), NC, TT, KT, YK, RR, HA, DD, NI					
b. Dependent Variable: QD					

In the ANOVA table, we can see that the F-value of 60.023, calculated from the R2 value with a Sig. value of 0.00, is very small, indicating that the regression model fits the data well and can be used.

**4.1.4.3. Regression Weight Test**

**Table 4.1.11: Regression Weight Table.**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	St. Error	Beta		
1	(Constant)	-.372	.213		-1,748	.082
	Overconfidence - TT	.155	.053	.137	2.916	.004
	Risk attitude - RR	.133	.047	.133	2.807	.005
	Herd behavior - DD	.111	.052	.107	2.109	.036
	Firm image - HA	.142	.056	.132	2.529	.012
	Accounting information – KT	.180	.051	.171	3.516	.001
	Neutral information – NI	.194	.063	.176	3.083	.002
	Advocate information – YK	.116	.046	.117	2.484	.014
	Personal financial needs - NC	.111	.048	.122	2.323	.021
a. Dependent Variable: QD						

In table 4.1.12, the results of the regression coefficients are shown. If Sig. < 0.05, which is equivalent to 95% confidence level and  $|t| > 2$ , then the factor is accepted, meaning that it has an impact on investment decisions. At the same time, the standardized Beta coefficient of the 8 independent variables is greater than 0, indicating that these independent variables have a positive impact on the dependent variable. In addition, all independent variables have a Sig. value less than 0.05, indicating that they are statistically significant in the model and reject the H0 hypothesis that the independent variables have no positive correlation with the dependent variable.

The regression coefficient is presented in two forms: unstandardized and standardized. Because the unstandardized regression coefficient (B) depends on the scale of measurement, we cannot use it to compare the impact of independent variables on the dependent variable in the same model. The standardized regression coefficient (Beta) is the coefficient that has been normalized for variables, so we can use it to compare the impact of independent variables on the dependent variable. The larger the weight of this variable, the stronger its impact on the dependent variable.

Therefore, the linear regression equation is as follows:

$$QD = .137*TT + .133*RR + .107*DD + .132*HA + .171*KT + .176*NI + .117*YK + .122*NC + \epsilon$$



## 4.1.4.4. Test of multicollinearity phenomenon

**Table 4.1.12: Multicollinearity statistics table.**

Model		Multicollinearity phenomenon	
		Tolerance	VIF
	(Constant)		
	Overconfidence – TT	.626	1.598
	Risk attitude - RR	.610	1.638
	Herd behavior - DD	.533	1.877
	Firm image - HA	.510	1.962
	Accounting information – KT	.582	1.718
	Neutral information – NI	.422	2.367
	Advocate information – YK	.619	1.616
	Personal financial needs - NC	.502	1.992

According to the table of multicollinearity statistics, the VIF coefficients of the independent variables have values ranging from 1.598 to 2.367 (all of them are less than 10). Therefore, it can be concluded that the model does not suffer from multicollinearity.

**4.2. Discussion**

Through the analysis, the study yielded the following results:

- Descriptive statistics on the survey sample characteristics to gain a better understanding of the subjects.
- Assessment of the reliability of the scale using Cronbach's Alpha coefficient, which showed that all variables had high reliability after removing those that did not meet the requirements.
- Exploratory Factor Analysis (EFA) identified 8 independent variables that impact a dependent variable, including Overconfidence (TT), Herd behavior (DD), Risk attitude (RR), Firm image (HA), Accounting information (KT), Neutral information (NI), Advocate information (YK), and Personal financial needs (NC).
- Multivariate regression analysis and hypothesis testing confirmed that investment decisions are influenced by the 8 factors mentioned above. Among them, Neutral information (NI) has the greatest impact on investment decisions.

**5. CONCLUSION**

The research offers valuable insights into the factors influencing investment decisions, particularly among students in the Vietnamese stock market. It successfully integrates psychological and social factors, providing a comprehensive understanding of the decision-making process.

The research model suggests that there are eight variables that have a positive impact on students' investment decisions. These variables encompass psychological factors such as overconfidence, risk attitude, and personal financial needs, as well as social factors including firm image, advice from advocates, neutral information, accounting information, and herd behavior. This represents a novel approach to the subject matter, as previous studies predominantly concentrated on either psychological or external factors in isolation. Moreover, this study overcomes limitations by analyzing both financial and psychological factors affecting individual investors, thus offering a more comprehensive understanding of the decision-making process, specifically among students in the present context.

One key finding of the research is the importance of neutral information in shaping investment decisions (= 0.176). This reflects that students' investment decisions are heavily dependent on information from the Government, social networks, past information, etc. Because students are the generation that grew up in the online world, the huge advantage of being able to capture information leads to the fact that when

the information is positive, student investors will tend to become more confident and invested. The second most influential factor on students' investment decisions is Accounting Information (= 0.171). The study also proves that the remaining factors also play a positive role in the investment decision.

In general, the topic can contribute a theoretical basis and solid arguments for managers to succeed in providing effective solutions, improving investment situations, especially in information asymmetry, along with promoting the strong development of Vietnam's stock market:

- For individual investors, the research emphasizes the importance of acquiring knowledge and skills in finance, understanding personal financial needs, and maintaining a balanced level of confidence. This highlights the need for investors to be well-informed and equipped with the necessary tools for effective decision-making.

- In terms of government policies, the study suggests enhancing credit for domestic businesses, ensuring strict regulations on securities margin trading, investing in advanced technology for securities companies, and imposing penalties for providing false information. These measures aim to create a more stable and reliable investment environment, fostering investor trust and confidence.

- The research also provides recommendations for joint-stock companies to enhance their attractiveness to investors. Transparency, positive image-building, attractive dividend policies, and expanding business areas are identified as key strategies to attract investors and create long-term value.

- Educational institutions, especially schools, should actively promote stock market knowledge among students. This can be done through initiatives like stock trading competitions, comprehensive training courses, and workshops to increase students' awareness and understanding of the stock market. By fostering financial literacy and investment skills early on, educational institutions can empower students to make informed financial decisions in the future.

The study on investment decisions in the Vietnamese stock market provides valuable insights but has limitations. It focused only on students and investors in Ho Chi Minh City, limiting the generalizability of the findings. Future research should include a more diverse sample from different regions of Vietnam to enhance understanding. Additionally, exploring the interaction between psychological and social factors and investigating other variables not covered would be beneficial. Addressing these limitations will improve the efficiency and knowledge of the stock market in Vietnam, benefiting investors, policymakers, joint-stock companies, and educational institutions. Future studies should also expand the sample size to include investors of all ages and from various cities. Furthermore, deeper exploration of the practical application of fundamental analysis and examination of the impact of significant events like the COVID-19 pandemic and oil price volatility would provide valuable insights.

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## ECONOMIC POLICY UNCERTAINTY AND INVESTMENT DECISIONS: DO BUSINESS CHARACTERISTICS MATTER?

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**ABSTRACT:** *This study is conducted to examine the impact of Global Economic Policy Uncertainty (GEPU) and China Economic Policy Uncertainty (China EPU - CEPU) on the size and efficiency of Vietnamese business investment. The research sample is collected through a 10-year period, from 2012 to 2021, including 190 firms listed on the Hanoi Stock Exchange (HNX) and the Ho Chi Minh City Stock Exchange (HOSE). After analyzing the research data, the authors draw a conclusion that uncertain global and China economic policies can inhibit the expansion and, at the same time, reduce the efficiency of business investment. In addition, the study also classifies the research sample into different groups based on specific characteristics, including business ownership, level of capital concentration, industry properties, and firms headquarter location, in order to investigate whether the influence of GEPU and CEPU differs for each business in these groups.*

**Keywords:** *Economic policy uncertainty, investment, efficiency*

### 1. INTRODUCTION

Economic policy uncertainty (EPU) rises from the fact that the government's policies and legal framework remain ambiguous and unclear, making investors and other businesses feel concerned and delay investment because of the risk of market uncertainty. In Vietnam, the national economy has dealt with several challenges from its volatile sides. Following a short time of stabilization at a low level since 2014, the EPU index suddenly increased again, with the reason being explained by the influence of the Covid-19 pandemic. However, in the second quarter of 2022, the volatility index of Vietnam's economic policy rose sharply again. The return of this index is explained by external influences such as the increase in global inflation, or the FED's interest rate policy putting pressure on the exchange rate. Along with that, there are problems related to the corporate bond market, leading businesses not to issue bonds to raise capital. The economic situation in Vietnam has suffered from many adverse effects of economic policy uncertainty, first on the financial system and then on the economy. Therefore, to reduce the uncertainty of economic policies, policymakers need to ensure transparency, consistency, and feasibility, thereby creating a foundation for the development and implementation of economic policies.

Currently, studying the impact of EPU on business investment activities as well as other activities is attracting many authors' attention (Li, Guo, & Chen, 2021). Most studies agree that elevated EPU has an inverse impact on investment (Gulen & Ion, 2016; Julio & Yook, 2012; Li & Yang, 2015). In addition, the reduction in investment, employment, and consumption by businesses and households is also found to be strongly related to high EPU (Gulen and Ion, 2016, Baker, Bloom, and Davis, 2016). Business investment activities are the most affected if there is a change in the EPU since rising EPU could slow down economic recovery and, make it difficult for governments to predict and at the same time increase investors' perception of risk and create negative sentiment among investors.

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From the aforementioned background, the authors conduct this study to examine the influence of EPU on business investment from the perspective of investment size and efficiency, in order to help businesses make rational decisions in different cases, limit the risks that businesses and government may face due to the impact of economic policy uncertainty. Therefore, the paper will in turn address the following specific objectives:

- i. Investigate the impact of global EPU and China EPU on the size and efficiency of business investment.
- ii. Explore the difference in the impact of global EPU and China EPU on businesses with different characteristics, including types of ownership, industry properties, level of capital concentration, and headquarter location.
- iii. Recommendations for businesses and managers to enhance investment performance optimally and effectively.

The research will be presented in three main directions. Firstly, we will examine the impact of the Global and China EPU index on business investment. China was chosen for the study among other nations since it is one of Vietnam's main trading partners. In recent years, the trade economy between Vietnam and this economy has been constantly developing, so any fluctuation in EPU of this country, and also the world, could directly affect Vietnam's economy. Secondly, our study will expand further by focusing on both the size and efficiency of business investment, and at the same time, explain the changes in investment behavior of firms through two categories: underinvestment and overinvestment. Lastly, the research will divide the research sample into 4 different groups of firms, according to types of ownership, industry properties, level of capital concentration, and firms headquarter location to examine the differences in the effect of EPU on each business of these groups.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Theoretical basis**

#### **2.1.1. Theories related to the business investment decisions**

Investment decisions of firms are decisions related to the total value of assets of the firm or the value of each part of assets (short-term and long-term assets) to orient long-term operations. Investing activity is sacrificing certain present value in exchange for uncertain (but greater) value in the future. This is an important factor that could directly affect the businesses since it creates value for the firm.

In the economy, investments take various forms. These include investing in fixed assets such as factories, machinery, and transportation to boost production capacity. Liquid asset investment involves raw materials and goods with changing volumes over time. Strategic investment aims to develop business strategies for increasing market share and competitiveness. Meanwhile, modernization investment concentrates on upgrading machinery and equipment to reduce costs and improve product quality. Expansion investment can be made for new businesses or by expanding production capacity for existing products. Replacement investments involve replacing outdated equipment to enhance operational efficiency. When making investment decisions, factors like interest rates, economic growth, wage, depreciation costs, and inflation's impact on the project should all be considered.

As an organization, when making an investment decision, it is necessary to carefully consider three closely related principles in investment decisions, including maximizing business value, considering the value of money over time, and risk-return trade-off. Making wise investment decisions will raise the

company's worth, which will increase the owner's asset value as well. On the other hand, if the incorrect investment choice is made, the business's value would drop, harming the owner's good.

### **2.1.2. Theories related to economic policy uncertainty**

There have been many economic-financial theories that suggest the causes of uncertainty in the economy, such as epidemics, terrorist attacks, financial crises, etc. One of the causes that has attracted much attention recently is economic policy uncertainty (EPU), which arises from the uncertain policies of the government (Baker et al., 2016). There are three components to the EPU, including uncertainty in the designation of policymakers, how monetary and fiscal policies are set, and the effect these new policies can bring to the economy. During the gubernatorial election period, the EPU can increase when the public is unsure about who will come up with new policies, when business managers cannot predict the imposition of new policies, or how new trade sanctions might affect their business activities (Mordfin, 2014). During this time, firms are required to carefully pay attention to the business environment in which their company operates, to be able to make prudent decisions and help minimize risks when investing. Since the EPU has a particularly negative impact on operational performance and the development of the economy, the ability to understand, analyze, and deal with this uncertainty is critical and indispensable for businesses.

The measurement of economic policy uncertainty is substantially crucial, especially when we want to assess its impact on various subjects. Baker et al. (2016) introduced a text-mining approach to construct media-based volatility indices. The index was built by the authors from two main sources of information. They analyzed phrases expressing economic policy uncertainty in articles, quantifying their frequency and sentiment using machine learning techniques. Additionally, they considered deviations in forecasted values of key economic indicators and variations among economic forecasters' perceptions. This comprehensive index provides valuable insights into the dynamics of economic policy uncertainty and its consequences on the economy and its participants.

However, one of the disadvantages of the text mining method is that it depends on media control and government interference. As a result, these indicators can change as the government deliberately alters the level of media control. To solve this problem, Jurado, Ludvigson & Ng. (2015) proposed alternative indicators reflecting the performance of the real economy and financial markets based on big data mining, as well as measuring the volatility of economic policy through two sets of data. Large data reflects the overall economic situation, including 132 indicators, whereas 147 indicators reflect different aspects of the economy. Market and business conditions include data from 155 US firms regarding daily sales and profits.

## **2.2. Previous empirical studies**

### **2.2.1. Previous research on the impact of EPU on the size and efficiency of business investment**

Several past researchers have investigated the effect of EPU on the size and efficiency of business investment. Using sample data of Chinese firms from Q1/2003 to Q4/2012, Y. Wang, et al. (2014) found that increasing EPU constrains businesses to scale up investments. In addition, those firms with the goal of expanding market share will be more sensitive, making businesses more cautious in maintaining their branches in other locations. In addition, the research results show that state-owned enterprises will be less affected by economic policy uncertainty than other businesses. T. Liu et al. (2022) also examined the influence of China's economic policy uncertainty (EPU) on business investment decisions, with the final results showing that an increase in EPU will make firms reduce their investment.

Using the measurement developed by Baker, Bloom, and Davis (2013), Gulen and Ion (2015) explored a strongly negative relationship between the degree of policy volatility and business capital investment.

Therefore, they drew a conclusion that the uncertainty of policies increases the benefits from investment delay, leading to firms' limiting expansion of investment. Furthermore, by using data collected from China, India, Japan, Pakistan, Singapore, and South Korea, Farooq, et al. (2022) discovered that EPU has an inverse effect on business investment, implying that an increase in economic policy uncertainty will discourage investment behavior because the risk of failure will increase during these times.

Sustainable development in the period of economic volatility is an extremely important factor, related to the survival of businesses. Guo, et al. (2020) examined the impact of economic policy uncertainty (EPU) on the investment value and profitability of 389 Chinese businesses and found that economic policy uncertainty could limit the profitability and size of business investment. Consequently, to promote investment and enhance operational efficiency, it is crucial for the government to minimize policy changes that can cause businesses to delay their investments. By providing a stable operating environment, businesses can effectively adapt new policies and make timely investment decisions.

Based on the results drawn from several previous research above, the authors formulate a research hypothesis about the relationship between economic policy uncertainty and the size of business investment as follows:

***Hypothesis H1: Economic policy uncertainty reduces the size of business investment.***

Meanwhile, according to Liu, Zhou, and Liu (2022), after testing the sample consisting of different Chinese businesses, the final results showed that the uncertain economic policy exacerbates the situation of overinvestment and underinvestment, thereby limiting the improvement of the efficiency of firm investment. Correspondingly, using a sample of businesses from 24 countries over the 2001–2020 period, Muhammad Ilyas and Muhammad Tahir Suleman (2022) investigated that, on the one hand, countries with low investor protection drive the negative effect of EPU on investment efficiency. On the other hand, countries with strong investor protection neutralize the adverse impact of EPU on their investment efficiency.

To find an empirical explanation of how EPU affects investment inefficiency, S. Akron et al. (2022) collected data from 5,836 Europe firms and separated them into 2 different groups: overinvested and underinvested firms. The results stated that, in terms of investment inefficiency, the impact of uncertainty is negative to the overinvested businesses and positive to the underinvested businesses due to asymmetric information. Another point that is taken into consideration is, uncertainty was also found to make business investment decisions better and improve the performance of firms.

From the empirical results concluded from previous research, the authors process to develop the second hypothesis as follows:

***Hypothesis H2: Economic policy uncertainty reduces the efficiency of business investment.***

**2.2.2. Studies related to the impact of EPU on business investment with different characteristics**

Bianco, et al. (2013) studied the relationship between uncertainty and investment of Italian private businesses. The results drawn from the research concluded that family business investments are more influenced and sensitive to uncertainty than non-family businesses, due to the higher risk aversion of family businesses. Furthermore, AzAzhar, Abbas, Waheed, & Malik (2019) also examined all non-financial businesses listed in Pakistan to investigate the impact of ownership structure and management on investment efficiency. They deduced that businesses are likely to get a higher level of investment efficiency when considering the decrease in the concentration level of the business, as explained by the stress for corporate management and the lower expected returns.

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In their research conducted to examine the impact of EPU on business investment in Australia from a sample of 391 firms in the period between 2022 and 2017, Wu, et al. (2020) discovered a positive association between EPU and the investments of businesses located in small states. However, the EPU influence on the investment activities of businesses located in large states is found to be insignificant. The conclusion that businesses in small states are more affected by EPU can be explained as due to the lack of economic development in small states, as well as the poor management structure which can make it hard for these businesses to respond to instability. Cui, et al. (2021), with a sample of 15030 observations over an 11-year period, from 2007-2017, also found the state ownership factor can weaken the effect of EPU on investment because SOEs (State-owned enterprises) are likely to be prioritized for protection by the government and have easier access to external financing.

Furthermore, Q. Kong, et al. (2022) carried out their study to investigate the association between EPU and the investment of Chinese firms. After analyzing their findings, the authors deduced that macro-policy uncertainty inhibits firms investment size and efficiency, whether the firms are operating in polluting or non-polluting industries. However, the influence is greater on firms belonging to the heavy-polluting industries.

Based on the results drawn from the research above, the authors proceed to develop the research hypothesis as follows:

*Hypothesis H3a: There is a difference in the impact of economic policy uncertainty on the investment of state-owned, private, FDI, and other businesses.*

*Hypothesis H3b: There is a difference in the impact of economic policy uncertainty on polluting and non-polluting businesses.*

*Hypothesis H3c: There is a difference in the impact of economic policy uncertainty on businesses with high capital concentration and low capital concentration.*

*Hypothesis H3d: There is a difference in the impact of economic policy uncertainty on businesses whose headquarters locate in non-central areas.*

### 3. RESEARCH METHOD

#### 3.1. Research data

The research sample of this research is collected from 190 Vietnamese businesses listed on the Hanoi Stock Exchange (HNX) and the Ho Chi Minh City Stock Exchange (HOSE) from 2012 to 2021. Data on the economic policy uncertainty (EPU) index is gathered by the authors from the website [policyuncertainty.com](http://policyuncertainty.com). The annual EPU is calculated by calculating the average of the 12 monthly EPUs provided by the website over the research period. Other data related to firms are collected from their published financial statements and annual reports.

#### 3.2. Research models

##### 3.2.1. The impact of economic policy uncertainty (EPU) on the size and efficiency of business investment

Firstly, the authors study the effect of economic policy uncertainty on the size of business investment. Based on the research of Huang, Lu, and Huang (2021), the model used to examine the impact of EPU on investment size is built as follows:

$$SCALE_{ijt} = \alpha_0 + \alpha_1 \cdot EPU_{ijt} + \alpha_2 \cdot SIZE_{ijt} + \alpha_3 \cdot AGE_{ijt} + \alpha_4 \cdot CF_{ijt} + \alpha_5 \cdot STRUC_{ijt} + \alpha_6 \cdot ROA_{ijt} + \alpha_7 \cdot RISK_{ijt} + \lambda_j + \mu_t + \varepsilon_{ijt} \quad (1)$$



in which, the subscripts  $i, j, t$  describe the business, industry, and research year, respectively. The dependent variable SCALE represents the investment size of the business, which measurement will be explained in detail below. EPU is the main independent variable which (comprises Global EPU and China EPU), showing the uncertainty of economic policy. The control variables including business size (SIZE), number of years operating since IPO (AGE), operating cash flow (CF), asset structure (AS), return on total assets ratio (ROA), and financial risk (RISK) are also added to examine the impact on the size of business investment. In addition,  $\lambda_j$  represents the industry fixed effect,  $\mu_t$  represents the time-fixed effects, and  $e_{ijt}$  is the residual of the model.

Secondly, after testing the influence of EPU on the investment scale of the business, the research also examines the impact on the investment efficiency after referencing the research of Q. Kong, et al. (2021) via the model as follows:

$$\text{EFFICIENCY}_{ijt} = \alpha_0 + \alpha_1 \cdot \text{EPU}_{ijt} + \alpha_2 \cdot \text{SIZE}_{ijt} + \alpha_3 \cdot \text{AGE}_{ijt} + \alpha_4 \cdot \text{CF}_{ijt} + \alpha_5 \cdot \text{STRUC}_{ijt} + \alpha_6 \cdot \text{ROA}_{ijt} + \alpha_7 \cdot \text{RISK}_{ijt} + \lambda_j + \mu_t + \varepsilon_{ijt} \quad (2)$$

### 3.2.2. Evaluating heterogeneity in the impact of economic policy uncertainty (EPU) on investment of businesses

Besides, to analyze the heterogeneity, the authors have classified the businesses into 4 different groups, including: firms with different types of ownership (State-owned Enterprises - SOEs, Private firms, Foreign-Invested firms, and Other firms), industry properties (Heavy polluting industries and Non-heavy polluting industries), level of capital concentration (Firms with high concentration of capital and firms with low capital concentration), firms headquarter location (Whose headquarters locate in non-central areas) and conduct the regression for these groups using model (1) and (2).

Specifically, on business ownership, firms with a share ownership ratio of more than 50% belonging to the State will be classified as “State-owned enterprises”. Besides, FDI firms are classified by consulting the list of foreign-invested businesses collected from the State Securities Commission (SSC). Regarding the classification of heavy polluting/non-heavy polluting firms, based on Appendix II to Decree 08/2022/ND-CP, the research classifies firms operating in the fields which are likely to cause environmental pollution at level I, including mineral processing, cast iron, steel, pulp, and paper production, chemicals, chemical fertilizers, textiles, garment, oil and gas, natural gas, and coal-fired power generation are heavy-polluting firms. Firms with capital concentration levels greater than the median value of the sample will be classified as having high capital concentration, whereas firms with capital concentration lower than the median value will be classified as having low capital concentration. Lastly, firms with their headquarters not located in 4 cities: Hanoi, Da Nang, Can Tho, and Ho Chi Minh are considered non-central.

### 3.3. Description of variables

#### 3.3.1. Dependent variables

**SCALE - Investment size.** *When making investment decisions, businesses must consider the size of the project. With large-scale projects, they have to face higher risks and unpredictable events in the future and must prepare a large investment capital. Additionally, it is necessary to have professional skills in using specific calculation methods. After referring to the studies of Huang, Lu, and Huang (2021), Kong, et al. (2022), the research has determined to measure the investment size of the business by taking the sum of (Net fixed-assets; Net intangible assets; Other assets) divided by total assets:*

$$\text{SCALE} = (\text{Net Fixed Asset} + \text{Net Intangible Asset} + \text{Other}) / \text{Total Assets}$$

**EFFICIENCY - Investment efficiency.** Before deciding to invest, it is necessary to evaluate the effectiveness under different aspects, especially from a financial perspective. Besides opening up opportunities for investors, investment projects can also bring unpredictable disadvantages, therefore, businesses must carefully evaluate before making the decision to invest or not. After referring to the work of Richardson (2006), Xin, Zheng, and Yang (2007), Huang, Lu, and Huang (2021), and Kong, et al. (2022), the research uses the absolute value of residuals from the following two investment scale models to measure the efficiency of business investments:

$$SCALE_{ijt} = \alpha_0 + \alpha_1 \cdot GROWTH_{ijt} + \alpha_2 \cdot LEV_{ijt} + \alpha_3 \cdot CASH_{ijt} + \alpha_4 \cdot LnAGE_{ijt} + \alpha_5 \cdot SIZE_{ijt} + \alpha_6 \cdot RETURN_{ijt} + \alpha_7 \cdot IvSCALE_{ij,t-1} + \sum Industry + \sum Year + \varepsilon_{ijt} \tag{3}$$

$$SCALE_{ijt} = \alpha_0 + \alpha_1 \cdot TOBINQ_{ijt} + \alpha_2 \cdot CASH_{ijt} + \alpha_3 \cdot LnAGE_{ijt} + \alpha_4 \cdot SCALE_{ij,t-1} + \sum Business + \sum Year + \varepsilon_{ijt} \tag{4}$$

$\varepsilon_{ijt}$  is the residual that the research needs to estimate. The larger the absolute value of the residuals from models (3) and (4), the higher the level of investment inefficiency of the business.

There is also the value of the residual  $\varepsilon_{ijt}$  from model (3) to assess the level of underinvestment and overinvestment of the business. Specifically, businesses with a positive residual value will be evaluated as overinvested (OVER), whereas a business with a negative residual value means that the business has not taken advantage of the capital to carry out all of the potential projects and will be assessed as underinvested (UNDER).

### 3.3.2. Independent variable

Economic Policy Uncertainty (EPU) is considered as an index measuring the volatility of world economic policies developed by Baker, et al. (2016) with data from 20 developed countries in the world. The variable EPU is a fairly new variable in empirical research on economic factors in general and investment in particular. An increase in the EPU means that investment decisions in equity are higher than those in financial assets, thereby reducing the risk suffered, and at the same time providing the foundation for businesses to have contingency strategies in place when similar situations arise (Yan Zhao, Kun Su, 2022).

**Table 3.1. Description of variables**

<i>Dependent variables</i>		
SCALE	Investment scale	(Net Fixed Assets+Net Intangibles + Other Assets)/Total Assets
EFFICIENCY	Investment efficiency	Absolute value of residuals from models (3) and (4)
OVER	Overinvested businesses	Positive residual value from model (3)
UNDER	Underinvested businesses	Negative residual value from model (3)
<i>Independent variable</i>		
EPU	Economic Policy Uncertainty	
<i>Control variables</i>		
SIZE	Business size	ln(Total assets)
AGE	Age of the business	ln(Year of research - Year of IPO)
CF	Cash flow from operating activities	(EBIT + Depreciation – Tax)/Total assets
AS	Asset structure	(Fixed assets + Inventory)/Total assets
ROA	Return on total assets	Net profit/Total assets
RISK	Financial risk	Liabilities/Total assets

*Source: Authors' collection*

### 3.4. Research methods

Firstly, we perform descriptive statistics to find the mean, standard deviation, maximum value, and minimum value of the research sample. Next, the Pearson correlation matrix was conducted to find out the relationship between the dependent variables, independent variables, and control variables in the research. Secondly, the Ordinary Least Squares (OLS) model was used to process the research data. The OLS model has been used for data analysis in previous studies by Kong, et al. (2022). The OLS regression model has the following functional form:

$$Y_{it} = \beta_0 + \beta_1 X_{1,it} + \beta_2 X_{2,it} + \dots + \beta_k X_{k,it} + \varepsilon_{ij}$$

In addition, the random effects model (REM) and fixed effects model (FEM) are also used to control for industry fixed effects and time fixed effects.

The random effects model (REM) has the form of a regression function as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1,it} + \beta_2 X_{2,it} + \dots + \beta_k X_{k,it} + v_i + \varepsilon_{ij}$$

in which,  $v_i$  are unobservable factors that change between subjects but are constant over time

The fixed effects model (FEM) has the form of a regression function as follows:

$$Y_{it} = \beta_0 + \beta_1 X_{1,it} + \beta_2 X_{2,it} + \beta_3 Z_i + \varepsilon_{ij}$$

$$Y_{it} = \beta_1 X_{1,it} + \beta_2 X_{2,it} + \alpha_i + \varepsilon_{ij}$$

in which  $\alpha_i$  are factors that vary between subjects but are not observable and do not change over time.

In order to choose which method is optimal among the three methods above, the study performed F-test and Hausman Test. Then, the research proceeds to test the violation of the model hypothesis. On checking multicollinearity, the authors utilize the correlation matrix and the results of the Variance Magnification Factor (VIF), specifically, the values of the correlation coefficients between the variables exceed 0.8 indicating that those variables are highly correlated with each other and there is a possibility of multicollinearity in the model. In addition, Breusch-Pagan test and Wooldridge test were also used to test the existence of heteroskedasticity and autocorrelation. Lastly, the Feasible Generalized Least Squares (FGLS) method is utilized to overcome the heteroskedasticity and autocorrelation problems occurring in the model.

On the other hand, to test the robustness of the research model, the authors use two-stage regression model (2-Stage Least Squares - 2SLS) and the instrumental variable (Instrumental Variable - IV) in order to overcome the endogeneity of the research variable, ensuring that the research results provided are consistent and reliable.

## 4. RESULTS AND DISCUSSION

### 4.1. Descriptive statistics

**Table 4.1. Descriptive statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
SCALE	1,900	0.5260006	2.951028	0	72.3294
EFFICIENCY	1,900	0.0925838	0.3880225	0.0003189	5.376628
GEPU	1,900	5.160471	0.3261291	4.663147	5.768465
CEPU	1,900	5.770543	0.6550507	4.735295	6.674402
SIZE	1,900	27.55337	1.629295	23.6367	33.69104

AGE	1,900	2.086913	0.4606799	0.1015175	3.064159
CF	1,900	0.0753431	0.1468228	-0.4913819	1.39701
AS	1,900	42.64342	462.1052	0	7482.773
ROA	1,900	0.0613562	0.0739716	-0.4148	0.7837
RISK	1,900	0.5008384	0.2828644	-0.3460092	7.133735

Source: Authors' calculation

Table 4.1 presents the descriptive statistics results. SCALE receives the mean value of 0.5260006, illustrating more than 50% of the assets of the businesses in the sample are long-term assets. In addition, the large standard deviation shows that the mean of SCALE cannot accurately assess the firms in the years from 2012 to 2021, for example, there is too big a difference between the largest value and minimum value. EFFICIENCY has a standard deviation of 0.3880225 with the minimum and maximum values are 0.0003189 and 5.376628, respectively. Meanwhile, GEPU has an average value of 5.160471, fluctuating from 4.663147 to 5.768465. The small fluctuation range shows that the global EPU maintains a stable level with little volatility. Besides, the maximum and minimum values of CEPU are 4.735295 and 6.674402, respectively. In recent years, due to the impact of the Covid-19 epidemic, China's economic policy uncertainty will have a great impact on the global economy. That is reflected in the fact that China's EPU is more volatile than the global EPU through the fluctuation range of them.

#### 4.2. Correlation matrix

Table 4.2. Correlation matrix

	SCALE	EFFICIENCY	GEPU	CEPU	SIZE	LNAGE	CF	AS	ROA	RISK
SCALE	1.0000									
EFFICIENCY	-0.0077	1.0000								
GEPU	-0.0194	-0.0004	1.0000							
CEPU	-0.0228	-0.0004	0.9518***	1.0000						
SIZE	-0.0055	-0.0568**	0.1141***	0.1233***	1.0000					
AGE	-0.0466**	0.1077***	0.5975***	0.6449***	0.2306***	1.0000				
CF	0.0092	0.0119	-0.0343	-0.0448**	0.0018	-0.0781***	1.0000			
AS	0.6009***	-0.0047	-0.0076	-0.0099	-0.0127	-0.0100	0.0049	1.0000		
ROA	0.0302	0.0498**	-0.0571**	-0.0434*	0.0234	-0.0303	0.2731***	0.0253	1.0000	
RISK	-0.0752***	-0.0055	-0.0424*	-0.0428*	0.2019***	-0.0705***	-0.1715***	-0.0265	-0.3255***	1.0000

Note: \*, \*\*, \*\*\* represent statistical significance at 10%, 5% and 1%, respectively

Source: Authors' calculation

In general, the dependent variables (SCALE and EFFICIENCY) and the main independent variable (GEPU and CEPU) were not correlated with each other. However, the Global Economic Policy Uncertainty and the China Economic Policy Uncertainty have a positive correlation with each other at the 1% statistical significance level, the correlation is 0.9518 (>0.8), indicating that multicollinearity may exist in the model. In addition, business size (SIZE) is negatively correlated with the business's investment efficiency at the 5% statistical significance level and positively correlated with GEPU and CEPU at 1% statistical significance.

Table 4.3. Economic policy uncertainty and investment of enterprises

	Investment scale		Investment efficiency			Overinvestment		Underinvestment		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Scale		Efficiency			Efficiency		Efficiency		
GEPU	-0,0136***		0,01235***	0,0007***			0,007***		0,0101***	
CEPU		-0,0118***			0,00058***	0,008***		0,0006***		0,0015***
SIZE	0,0261***	0,0263***	-0,00004	0,00005	0,000004	-0,0002	0,0003**	0,0020**	-0,0003*	-0,0017*
AGE	-0,126***	-0,132***	-0,00033**	0,0005	-0,00088***	-0,0037**	0,0004	0,0035	-0,0005	0,0082**
CF	0,0618	0,0621	-0,00091***	0,0033	-0,0016**	0,0004	-0,0004	-0,0003	-0,003*	0,0116
AS	0,000003	0,000002	0,000003***	-0,00001***	0,000003***	-0,00001***	0,00004***	0,00005***	-0,000003***	0,00001*
ROA	-0,3***	-0,2959***	0,00191*	-0,0137	0,00057	-0,0161	-0,0133***	-0,0451***	0,0078**	-0,0429*
RISK	-0,5112***	-0,5144***	0,00071**	0,0017	0,00058	0,0026	0,0009	0,0027	0,0032***	-0,0169**
_cons	0,1082	0,1183	-0,01561	0,0531	0,04570	0,0215	0,0027	-0,0103	0,0013	-0,0287

Note: \*, \*\*, \*\*\* represent statistical significance at 10%, 5% and 1%, respectively

Source: Authors' calculation

### 4.3. The impact of economic policy uncertainty (EPU) on the size and efficiency of business investment

In columns (1) and (2), the regression coefficients of GEPU and CEPU are -0.0136 and -0.0118, respectively, and significant at a 1% level, which implies that when other factors remain constant, GEPU increases by 1 percentage point will make investment size decrease by 0.0136 percentage points, and when CEPU increases by 1 percentage point, investment size will decrease by 0.0118. This demonstrates that the size of Vietnamese business investment is massively affected by the China economic policy uncertainty - a border country and an important trading partner in most manufacturing businesses.

AGE is also one of the factors that reduce the size of business investment. This often arises from competition for market share among businesses in the same sector during periods of economic policy uncertainty, which is in agreement with Q. Nguyen and H.T. Kim (2023). The only factor that increases the size of business investment is the firm size, meanwhile, business risk is found to have a negative association with investment scale.

Additionally, results from columns (3) - (6) on the effects of EPU on investment efficiency show that both global EPU and China EPU have positive impacts on business investment efficiency, no matter how EFFICIENCY is measured. Besides, the age of the business is also found to adversely influence investment efficiency. As a corporation age, investment policies and risk tolerance have already been maintained for a considerable amount of time. As a result, when businesses experience economic policy disadvantages, their investment alternatives will eventually become less effective than those of younger firms.

From the results from columns (7) and (8), it can be concluded that when considering two different types of businesses, the underinvestment businesses will be more sensitive to EPU compared to the overinvestment ones. This is partly based on the Catch-up Effect when underperforming businesses will take advantage of the benefits of adjusted economic policies to create value for their businesses. However, overinvested businesses are found to be more sensitive than those in the other group when it comes to the effect of asset structure (AS).

### 4.4. Endogeneity test

To further address the endogeneity problem, we continue conducting the 2SLS regression to estimate the impact of EPU on the investment, using alternative EPU index as instrumental variables. Based on the approach from Peng, et al. (2018) and Wu, et al. (2020), we decided to use the US and Korea EPU in

building the instrumental variable. Regression results using instrumental variables GEPUhat and CEPUhat are presented in Table 4.4.

**Table 4.4. Endogeneity test with instrumental variable regression (2SLS)**

	Investment scale		Investment efficiency		Overinvestment		Underinvestment	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Scale		Efficiency		Scale		Efficiency	
GEPUhat	-0,067**		0,1931***		0,5067***		0,0067***	
CEPUhat		-0,0413**		0,1086**		0,2896**		0,0208*
SIZE	0,0306***	0,0309**	0,0038**	0,0038	0,0367**	0,0366**	-0,0024***	-0,0024***
AGE	-0,1753***	-0,1807**	-0,1201*	-0,1196**	-0,3305***	-0,3292***	0,0069***	0,0066***
CF	0,1033***	0,1062**	-0,0530*	-0,0521**	-0,1698***	-0,1687***	-0,0009***	-0,0011***
AS	-0,00002***	-0,00002**	0,00001**	0,00001***	0,0001**	0,0001**	0,0000***	0,0000***
ROA	-0,0924	-0,0876**	-0,3460*	-0,3480***	-0,3808***	-0,3874***	-0,0195**	-0,0182***
RISK	-0,5524***	-0,5555**	-0,0415**	-0,0414**	-0,0934*	-0,0921**	-0,0090***	-0,0088
_cons	-0,0657	0,0079**	-0,2036**	-0,0553*	-2,9136**	-1,9581	0,0051***	0,0577***

Note: \*, \*\*, \*\*\* represent statistical significance at 10%, 5% and 1%, respectively

Source: Authors' calculation

Table 4.4 presents the regression results from the 2SLS model. Except for the investment size, the coefficients of GEPUhat and CEPUhat are positive and statistically significant. Specifically, the regression coefficient of GEPUhat and CEPUhat are -0.067 and -0.0413 and statistically significant at 1% level for investment size, implying that other things being constant, a 1 percentage point increase in global and China economic policy uncertainty will cause firms to reduce their investment scale by 0.067 and 0.0413 percentage points, respectively. This indicates that the instrumental variables selected in this study are strongly correlated with endogenous variables. Regression results for GEPUhat and CEPUhat, which are considered in this study, are generally in agreement with the estimates in Table 4.3. Therefore, the results estimated above are robust and free from endogeneity problems.

#### 4.5. Impact of economic policy uncertainty (EPU) on the size and efficiency of business investment by different business's characteristics

##### 4.5.1 Impact of economic policy uncertainty (EPU) on the size and efficiency of business investment by types of ownership

First, examine the effects of global economic policy uncertainty (GEPU) and China economic policy uncertainty (CEPU) on investment size, the results show that both global and China EPU have inverse effects on the investment size of businesses with different ownership structures. GEPU and CEPU are found to have the least influence on the investment scale of state-owned enterprises. A possible reason for this difference is that SOEs have better access to government subsidies and external financing through guarantees and policy support from the government. Therefore, changes in macroeconomic policy uncertainty have less impact on their investment behavior. Furthermore, because governments at all levels have an advantage in mobilizing SOEs, they tend to give priority to interfering in the operations of SOEs, especially their investments when there is uncertainty in local policy and increased demand for steady growth. (Li, Xu, & Wang, 2021).

Table 4.5. Uncertainty of economic policy, types of ownership and investment of enterprises

	State-owned				Private				FDI				Others			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Scale		Efficiency		Scale		Efficiency		Scale		Efficiency		Scale		Efficiency	
GEPU	-0,0491***		0,0033*		-0,1691*		0,0323***		-0,0914*		0,001**		-0,0923**		-0,0073	
CEPU		-0,0286***		0,009***		-0,078		0,0096**		-0,0462**		0,0007*		-0,0564***		-0,0037
SIZE	0,0255***	0,0178***	0,00002	-0,0065***	-0,0125	-0,0126	-0,0117***	-0,0117***	-0,3554	0,2005**	-0,0092***	-0,0097***	-0,0096	-0,0118	0,0193***	0,0192***
AGE	-0,0203*	-0,0088	-0,0008	0,0074***	0,1168	0,1166	-0,026***	-0,0174**	-1,9715***	-0,5415*	0,0017	0,002	0,1053***	0,1177***	-0,0102***	-0,0097**
CF	0,2449***	0,2932***	0,01	0,0054	0,2937*	0,2871	-0,0205	-0,0228	-0,29	-0,1980	-0,0306***	-0,0315***	0,1675	0,1900	-0,0099	-0,0092
AS	0,0118***	0,3516***	-0,0001***	-0,0482***	0,0048***	0,0047***	0,000***	0,00001***	0,1534	1,1026*	0,0245**	0,0265**	-0,0097***	-0,0095***	-0,0004*	-0,0004**
ROA	-0,2265**	-0,2274*	0,0272***	0,0169	0,6111*	0,6349*	-0,1814***	-0,1274***	1,9976	-0,3372	0,0638***	0,0743***	-0,4676**	-0,4812**	-0,0840***	-0,0846***
RISK	-0,201***	-0,2307***	0,0222***	0,0399***	-0,2543***	-0,2521***	-0,0099	0,0037	-2,4448	0,1556	0,007	0,007	0,0728	0,0885	0,0731***	0,0721***
_cons	-0,0321	-0,0626	0,0390	0,1925	1,3513	0,9308	0,2009	0,2839	1,6888	-4,5271	0,2822	0,2948	0,7946	0,6714	-0,4311	-0,4451

Note: \*, \*\*, \*\*\* represent statistical significance at 10%, 5% and 1%, respectively

Source: Authors' calculation

Next, examining the influence of GEPU and CEPU on the efficiency of business investment shows that the regression coefficients of both GEPU and CEPU are positive and statistically significant in the sample of state-owned businesses, private businesses, and foreign-invested businesses, while other businesses are not affected. Having the largest regression coefficients demonstrates that global policy uncertainty (GEPU) and China economic policy uncertainty (CEPU) have a substantially adverse impact on the efficiency of private business investment.

#### 4.5.2. Impact of economic policy uncertainty (EPU) on businesses' investment scale and efficiency by industry properties

The results of testing the impact of economic policy uncertainty on the size and efficiency of business investment by industry properties are presented in Table 4.6. The results show that the global EPU and the China EPU both have major influences on the size and investment efficiency of the firms operating in heavily polluted industries. Specifically, the regression coefficients of GEPU and CEPU are -0.057 and -0.034 and significant at 1% level, respectively, implying that other factors remain unchanged, global and China EPU increase of 1 percentage point will cause firms to reduce their investment size by 0.057 and 0.034 percentage points, respectively. In contrast, GEPU and CEPU improve the investment efficiency of firms. The regression coefficients of GEPU and CEPU are both positive and statistically significant at 1%, implying that when the uncertainty of global and China economic policies increases, it will reduce the investment efficiency of businesses. For businesses operating in non-heavy polluting sectors, the impacts of GEPU and CEPU on investment efficiency are negligible. Regarding the investment scale, GEPU and CEPU are found to have positive associations.

Table 4.6. Economic policy uncertainty, industry properties and investment of enterprises

	Heavy polluting				Non-heavy polluting			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Scale		Efficiency		Scale		Efficiency	
GEPU	-0,057***		0,0122***		0,1039*		0,0016	
CEPU		-0,034***		0,0097***		0,0592*		0,0013
SIZE	0,0129***	0,0125***	0,0103***	0,0081***	0,0399***	0,0387***	0,0035***	0,0036***
AGE	0,0382***	0,0449***	-0,0364***	-0,0341***	-0,1716***	-0,1903***	-0,0058***	-0,0065***
CF	0,2068***	0,2076***	0,0067	0,0018	0,0876	0,0735	-0,0112***	-0,0119***
AS	0,0043***	0,0043***	-0,00002*	-0,00002**	0,0049***	0,0049***	-0,000005***	-0,000005***
ROA	-0,0867	-0,0900	-0,0887	-0,0999*	1,0079***	1,0006***	-0,0205***	-0,0209***
RISK	-0,0182	-0,0164	-0,0513***	-0,0478***	-0,4774***	-0,4876***	0,0078***	0,0076***
_cons	0,1689	0,0691	-0,1870	-0,1243	-0,7934	-0,5180	-0,0377	-0,0370

Note: \*, \*\*, \*\*\* represent statistical significance at 10%, 5% and 1%, respectively

Source: Authors' calculation

**4.5.3. Impact of economic policy uncertainty (EPU) on the size and efficiency of business investment by the degree of equity concentration**

**Table 4.7. Economic policy uncertainty, industry properties and investment of enterprises**

	High capital concentration				Low capital concentration			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Scale		Efficiency		Scale		Efficiency	
<b>GEPU</b>	-0,0042		-0,0013		-0,0171***		0,0202***	
<b>CEPU</b>		-0,0052		-0,0009*		-0,0169***		0,0142***
<b>SIZE</b>	-0,0084***	-0,0083**	0,002***	0,0021***	-0,0145***	-0,0073**	0,0286***	0,0166***
<b>AGE</b>	-0,0166	-0,0128	0,0004	0,0006	-0,0445***	-0,0391***	-0,0404***	-0,0320***
<b>CF</b>	0,2870***	0,2848***	0,0015	0,0019	0,0185	0,0037	0,0396	0,019
<b>AS</b>	0,005***	0,005***	-0,00001***	-0,00001***	0,0048***	0,0048***	0,000005***	0,00001***
<b>ROA</b>	-0,3233***	-0,3284***	-0,0088**	-0,0083**	0,0095	-0,1549**	-0,0133**	-0,0834**
<b>RISK</b>	-0,0007	-0,0013	-0,0028*	-0,0028*	-0,1703***	-0,2183***	-0,0451***	-0,0579***
<b>_cons</b>	0,6337	0,6314	0,0131	0,0102	0,8380	0,6750	-0,7378	-0,3802

Note: \*, \*\*, \*\*\* represent statistical significance at 10%, 5% and 1%, respectively

Source: Authors' calculation

In this study, we use the share ownership ratio of the largest shareholder of the firm to measure the degree of equity concentration and divide the data set into 2 categories: firms with high equity concentration and firms with low equity concentration. The degree of equity concentration is determined by adjusting the share ownership ratio according to the industry characteristics, external environment, and internal performance of the company (Li, 2017). It can be seen that the EPU has varying effects on the investment choices made by businesses, depending on their equity concentration level.

GEPU and CEPU are found to have significant impacts mostly on the investment size and efficiency of firms with low equity concentration. These results indicate that policy uncertainty has a stronger inverse impact on the low capital concentration firms. This is explained by the fact that the low level of capital concentration means that the ownership of the company is more dispersed, which reduces the cost of the firm's investment decisions and increases the potential for conflicts, interests between shareholders and managers, leading to inefficient investments. As firm ownership becomes more dispersed, the costs of corporate investment decisions increase and there is a potential for conflicts of interest between shareholders and managers, resulting in ineffective investment (Yu & Wang, 2019; Zhong, Ran, & Wen, 2009).

**Table 4.8. Economic policy uncertainty and investment of enterprises located in non-central areas**

	Investment scale		Investment efficiency		Overinvestment		Underinvestment					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)				
	Scale		Efficiency		Scale		Efficiency					
<b>GEPU</b>	-0,0721***		0,0109***		-0,1041**		0,0096***		-0,051*		0,0037**	
<b>CEPU</b>		-0,0504***		0,0024***		-0,0631**		0,0058***		-0,0195***	0,0023**	
<b>SIZE</b>	-0,0121**	-0,0208***	-0,0096***	-0,0097***	0,0093	0,0079	-0,009***	-0,0089***	-0,0005	0,0258***	-0,0008*	-0,0007*
<b>AGE</b>	0,0584***	0,0674***	-0,0006	0,0002	0,0791***	0,0907***	-0,0045**	-0,0058**	-0,0445**	-0,0663***	-0,0035***	-0,0042***
<b>CF</b>	0,3595***	0,3452***	-0,0076**	-0,0088***	0,484***	0,4789***	-0,0176**	-0,0179**	0,2023***	0,1606***	0,0047**	0,0046**
<b>AS</b>	0,0049***	0,0049***	0,00001***	0,00001***	0,0117***	0,0117***	0,00002***	0,00002***	0,0048***	0,0048***	-0,00001***	-0,00001***
<b>ROA</b>	-0,3048**	-0,3717***	-0,0093	-0,0020	-0,2330	-0,2343	0,0002	0,0021	0,0267	-0,0617	0,0152**	0,0144**
<b>RISK</b>	0,0436	0,0591**	0,0113***	0,0137***	-0,0022	-0,0016	0,0018	0,0008	-0,3682***	-0,4571***	0,0027	0,0026
<b>_cons</b>	0,9382	1,0539	0,1588	0,2007	0,4591	0,2986	0,1760	0,1925	0,8401	-0,0119	0,0869	0,0927

Note: \*, \*\*, \*\*\* represent statistical significance at 10%, 5% and 1%, respectively

Source: Authors' calculation



#### ***4.5.4. Impact of economic policy uncertainty (EPU) on businesses' investment scale and efficiency after excluding businesses located in non-central areas***

The result shows that GEPU and CEPU both have adverse impacts on the businesses located in non-central areas. Comparing the mean and absolute values of the coefficients, it can be concluded that both GEPU and CEPU have a statistically negative relationship with the investment of overinvested businesses. The coefficients of GEPU and CEPU are both significant at the 5% significance level. The uncertainty of the global and China economic policy also do not improve the investment efficiency of overinvested businesses when the regression coefficients of GEPU and CEPU were both positive and statistically significant at 1% level, showing that when the uncertainty of global and Chinese economic policies increases, it will have a negative effect on the investment efficiency of overinvested businesses. The results showed that because overinvested firms usually have investment size larger than others, or operate in key industries, or are frequently involved in huge and complicated projects, EPU thus has a greater impact on these business investment decisions. Furthermore, economic policy uncertainty might raise the risk of businesses overinvesting in complicating project management, and capital recovery. Because it diminishes the project's desirability, it influences investment decisions.

## **5. CONCLUSION**

### **5.1. Conclusion**

In this study, the authors examine the impact of Global economic policy uncertainty and economic policy uncertainty of China - one of the main trading partners of our country - on the size and efficiency of Vietnamese business investment using the economic policy uncertainty index. The research results show that, on the one hand, GEPU and CEPU both have negative impacts on the size and efficiency of business investment, because when the economic policies are not stable, firms may have to face greater risks in the process of raising capital, and it is more challenging for managers in the process of analyzing and evaluating projects, and firms would limit their expansion invest to reduce risk (Huang et al., 2021). On the other hand, GEPU and CEPU are also found to have a positive effect on the overinvestment or underinvestment state of firms. The more uncertain the economy is, the more serious the firm's overinvestment or underinvestment situation will be. Results from the robustness test also show a similar effect of GEPU and CEPU on investment size and efficiency, demonstrating the robustness of the regression model. Moreover, the study also classifies the businesses into different groups, including types of ownership, industry property, level of capital concentration, and firms headquarter location, with the results showing that there is a difference between the effects of EPU on the investment of each business in these groups.

### **5.2. Limitations**

This study has only tested using the Global and China economic policy uncertainty index, but not measuring and testing the impact of Vietnam EPU because of difficulties in collecting the data. Moreover, the data collected on the financial statements of businesses is not consistent from year to year within the timeframe of the research because of the "double entry" nature of transparency and accuracy in ethical principles of accounting. Because businesses may tend to switch accounting units from year to year, the figures in the financial statements may have large and small differences, leading to the research results may be slightly different in terms of data but does not significantly affect the accuracy of hypothesis testing.

### **5.3. Recommendations**

Drawing from the above findings, the authors propose a number of solutions with the aim of limiting the impact of global EPU and China EPU on Vietnam's economy. Firstly, the government and businesses must pay close attention to monitoring the fluctuations of the world economic policies, as well as those countries that play an important role in our economy, like China. Especially in the period of 2020-2021 when the Covid-19 pandemic was spreading, proactively capturing, and evaluating information at the right

time can help Vietnam become more flexible in issuing information, in order to support and encourage firms in developing and expanding their investment scale. Secondly, the government must keep enhancing its policies and fostering the conditions that encourage businesses to grow, scale up, and increase investment effectiveness. However, in doing so, it is crucial to take into account the ownership structure and unique traits of each industry and business in order to implement the proper policies.

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## DEVELOPING A Z-SCORE MODEL TO PREDICT THE LIKELIHOOD OF BANKRUPTCY FOR REAL ESTATE COMPANIES IN VIETNAM'S STOCK MARKET

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**ABSTRACT:** *The Z-Score model and numerical analysis approach serve as the theoretical foundations on which the authors' study is built. Its objective is to create an appropriate bankruptcy risk prediction model for real estate companies listed on the Hanoi and Ho Chi Minh City stock markets. The research paper collects secondary data from financial statements. A total of 72 companies were sampled and divided into two groups: 'Good' businesses that operating normally and financially stable, and 'Bad' businesses that are in danger of bankruptcy. Based on the chosen financial indicators, the authors developed a new Z-Score model. This model allows for the categorization of risks associated with real estate firms listed on stock exchanges.*

**Keywords:** *Z-Score, bankruptcy, real estate, stock market*

### 1. WHY CHOOSE THE TOPIC

Bankruptcy is an observable phenomena that doesn't exclude any businesses in a market economy. Therefore, predicting the likelihood of bankruptcy is always a crucial task to assist investors in creating strategies to promptly modify firm operations.

The General Statistics Office claims that the business sector has been adversely affected by the severe fourth wave of Covid-19 breakout, stringent lockdowns, and protracted distancing (particularly in Q3/2021). Nearly 55 thousand businesses suspended operations for a period of time in 2021, up 18% from the previous year; 48.1 thousand businesses ceased operations while undergoing dissolution procedures, up 27.8%; 16.7 thousand businesses completed dissolution procedures, down 4.1%, of which 14.8 thousand businesses had capital scales of less than VND 10 billion, down 4%; and 211 businesses with capital scales of over VND 100 billion, did not dissolve. Every month, on average, around to 10,000 companies leave the market because they are unable to "resist" the Covid-19 pandemic's brutality.

Finding a tool to quickly anticipate the risk of bankruptcy of businesses is crucial to be able to offer warnings to investors and assist businesses adjust as a result of the bankruptcy of thousands of firms as well as thousands of other businesses facing the danger of bankruptcy. The turn is more appropriate. The study of bankruptcy forecasting has been studied extensively across the globe in the context of risk management and credit rating. However, there is still little use of these models for predicting in Vietnam. Additionally, the predictive power of these models in the Vietnamese real estate market hasn't been thoroughly examined in many empirical research.

In order to predict the likelihood that a company would file for bankruptcy, a variety of models are available. Some of these models include Altman's Z-Score model, Ohlson's O-Score model, and KMV model. In particular, the Z-Score model, which is used in the majority of nations, is regarded as a pioneer model for predicting bankruptcy risk in the future.

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After more than 2 years of the Covid-19 pandemic, which has not yet recovered, the real estate market continues to face challenges due to strict control policies on capital flows, causing the supply to fall drastically, high prices that, on average, are above the purchasing power of the majority of low-income people, but liquidity that is almost “immobile”. In most areas, the real estate price level has climbed as well, continually setting a new price level. When prices are consistently driven up but market liquidity does not follow suit, the possibility of a real estate “bubble” starts to surface. After the Covid-19 epidemic, the domestic economic market experienced fluctuations, and business in the real estate sector had an impact on bank investments as well. This demonstrated the importance of credit ratings in comparison, and how timely information can help banks make better investment decisions. The authors chose the study “Developing a Z-score model to predict the likelihood of bankruptcy for real estate companies in Vietnam’s stock market” in order to help improve the efficient operation of real estate enterprises by forecasting the bankruptcy risk of these enterprises.

## **2. RESEARCH OVERVIEW AND RESEARCH METHODOLOGY**

### **2.1. Research overview**

Numerous studies have been done in Vietnam to determine how well the Z-score model predicts the possibility that real estate businesses listed on the Vietnamese stock exchange would file for bankruptcy. For instance, Vo Van Nhi and Hoang Cam Trang (2013) investigated the connection between 85 enterprises listed on HOSE in the 2011 accounting period’s profit adjustment behavior and bankruptcy risk. Leuz & Associates’ (2003) and Altman’s Z-index model’s (2000) analyses of profitability adjustment behavior and corporate bankruptcy risk were merged by the author. The study sample was chosen by the authors to include HOSE-listed firms, enterprises that must submit financial statements, and other company kinds. Because the author evaluates the standard deviation measurement based on a formula that defines the adjusted behavior of profits for 5 consecutive years, the financial statements of the chosen firms must be published on the HOSE website with data for at least 5 consecutive years from 2007 to 2011. The findings demonstrate that the level of profit adjustment is inversely correlated with the risk of bankruptcy, i.e., the company with the lowest average profit adjustment will have a lower risk of bankruptcy (in the safe zone), and companies with high or very high average profit adjustment will be warned that they are at risk of bankruptcy or bankruptcy.

Korol (2013) analyzed data from 185 Warsaw Stock Exchange businesses and 60 Mexican, Argentina, Peruvian, Brazilian, and Chilean enterprises. Each business is evaluated based on the absolute value of 14 financial indicators as well as the change in these indicators. The author examined over 400 studies from around the world devoted to corporate bankruptcy forecasting models to determine how effective statistical methods (DA analysis and decisional trees) and artificial intelligence techniques (ANN) are in predicting the bankruptcy of businesses in the United States, Latin America, and Central Europe one year and two years before bankruptcy. The CART model beat the ANN model for Latin American enterprises by 4.35 percentage points in the year before bankruptcy (96.66% vs 92.31%) and 3.97 percentage points in the two years before default (95% vs 91.03%). The difference in efficiency gains between the CART and ANN models was even greater in Central European companies: 11.05 percentage points in the year before the financial collapse (96.23% vs 85.18%) and 14.61 percentage points in the previous two years of bankruptcy (88.68% vs 74.07%). The author demonstrated that bankruptcy in dynamic and uncertain marketplaces such as Latin America may be efficiently forecast using a population of 60 Latin American enterprises.

In addition to employing the KMV-Merton model, our country has published a number of research papers on the model in order to anticipate default risk and other sectors of the economy. Nguyen Thi Tuyet

Lan (2019) used the O-score model, as well as quantitative research methodologies and logit analysis techniques, to get a more thorough understanding of the variables influencing the bankruptcy of specific firms in the construction sector that are publicly traded. The study analyzed data from 109 businesses listed on the HOSE and HNX exchanges during a 13-year period, with a sample size of up to 1417. Following an examination of the survey sample, it was discovered that two factors contribute to the enterprise's bankruptcy risk: total debt to total assets has the same impact as the enterprise's bankruptcy risk, and the rate of return on total assets has the opposite effect. This study does not contain linear multi-additive flaws, is not deviated, and is effective since the correlation coefficient is less than 0.8. This article also offers several corporate governance strategies, such as increasing business efficiency or changing debt ratios as the business grows. Empirical study on the factors influencing bankruptcy risk for particular organizations is required since it represents the circumstances in which enterprises find themselves.

Hoang Thi Hong Van's research from 2020 used the Z-Score model to evaluate the model's accuracy in predicting the performance of Vietnamese businesses by gathering data from 30 active businesses at the time of the study. The study data comprises all joint stock firms that were liquidated or dissolved by decision of the Court in accordance with rules between 2012 and 2019 and delisted from the Ho Chi Minh Stock Exchange (HOSE) and the Hanoi Stock Exchange (HNX). The study's findings indicate that the Z-Score model is 70% accurate in predicting enterprise bankruptcy in Vietnam two years out and 76.67% accurate one year out. When using the Z-Score model of Altman et al. (2007) to forecast bankruptcy enterprises one year in advance, the model can achieve average accuracy 76.67% (high accuracy, ability to predict bankruptcy 1 or 2 years in advance). The ROA (Return on Assets), also known as the return on total assets, in the non-bankrupt group ranges from 4% to 5.5%, more than double that of bankrupt enterprises (only about 2%). Similar to the ROE (Return on Equity), return on equity or return on capital is an indicator used to evaluate the health of the business. For businesses that are operating normally, the ROE is typically about 11.2% higher than the bank interest rate, while in the group of bankrupt companies the ROE is typically less than the interest rate on bank loans. According to studies, the group of insolvent businesses has much worse ROA and ROE than those that are still functioning, and their average asset value growth is also lower than that of operating businesses. In order to examine and evaluate the financial status and the "health" of the firm and make the best investment decisions, financial analysts and users of financial information can utilize the Z-Score model.

## 2.2. Research methodology

Data sources include credible websites like investing.com and coffee F.

Information is gathered from the financial accounts of real estate businesses that are listed on stock markets, including balance sheets and business performance.

Using studies on anticipated sample sizes from Hair, Anderson, Tatham, and Black (1998) as a guide. The minimal sample size is thus five times the total number of variables that were observed. The research team chose the sample size of 72 companies because, according to reliable information sources, there are 72 listed real estate companies that have a sufficient number of highly accurate financial indicators that the team needs to gather in order to conduct the research and satisfy the requirements of the aforementioned sample selection theory when the number of variables depends on the equation. Five variables make to the final sequence.

The group first chose 10 independent variables that essentially covered all categories of fundamental financial indicators (such payments, profitability, ...). From then, the group discovered that 5 variables had the best distinguishability and the largest association with the Z-dependent variable.

The rationale behind choosing this study model is because there are other models available for predicting a company's risk of bankruptcy, each with its own benefits and drawbacks. Examples include Altman's Z-Score model, Ohlson's O-Score model, and the KMV model. In particular, the Z-Score model, which is used in the majority of nations, is regarded as a pioneer model for predicting bankruptcy risk in the future.

Describe how this model allows for forecasting and why: The study team used data from real estate company indicators to create this Z-score model, which is appropriate for both the specific features of the local real estate market and the economic climate of Vietnam. Additionally, because the data was acquired in 2021, it more accurately represents studies that used data from earlier times that are no longer applicable to the current situation.

Following the selection of the observed sample using the aforementioned criteria, the research calculates the financial metrics for each firm in the chosen sample. Calculate the chosen indicators next, then split the businesses into two groups.

To describe and evaluate data in a generic fashion, perform selected statistical descriptions of certain typical values of independent variables, such as mean, maximum value, minimum, and standard deviation. The study that follows will be influenced by these ideals.

The study evaluates two hypotheses the difference in group mean and the equality of group variance to make sure that the research data support the hypotheses and that the analysis's findings are statistically significant. On the SPSS program itself, Box's M and Wilks Lambda tests were run. The analysis results may be justified if the mean hypothesis for the groups is met and the variance between the groups is equal (Hoang Trong, 2008).

Following the completion of the aforementioned tests and fulfillment of the model's hypothesis, the research will evaluate the analysis data collected using the Discriminant Analysis command in the SPSS program. Structural Correlation Coefficient, Normalized Canonical Coefficient, Unnormalized Canonical Coefficient, and Model Classification outcomes are some of the analysis outcomes for all variables.

The study further chooses the financial variables that have the strongest correlation with the dependent variable (Z-score) and then conducts an analysis in accordance with the stated steps, i.e., done with all 10 variables, with the goal of identifying financial factors that are crucial for performing the classification of businesses in the sample.

The final phase in the estimation process of the categorization model for real estate firms in Vietnam is to remark on the model's complete and incomplete features, as well as its benefits and drawbacks, given the time and resources available for study. As a result, the study will offer advice to state management organizations and identify areas for further research.

The following is how the research model is presented:

$$Z_i = D_1 X_{1i} + D_2 X_{2i} + D_3 X_{3i} + \dots + D_n X_{ni} \quad (3.1)$$

### 3. RESEARCH RESULTS

#### 3.1. Selecting indicators and filtering for highly reliable indicators

The target groups that will be used are quantitative. Each spending group takes from 2-3 indicators as a representative and fully reflects the efficiency and risks of the business.

**Bảng 3.1. Tests of Equality of Group Means**

	Wilks' Lambda	F	df1	df2	Sig.
Current Ratio	,905	7,308	1	70	,009
Quick Ratio	,919	6,132	1	70	,016
Cash Ratio	,986	,961	1	70	,330
Debt to equity ratio	,982	1,292	1	70	,260
Self-financing rates	,982	1,292	1	70	,260
ROA	,430	92,701	1	70	,000
ROE	,336	138,048	1	70	,000
EPS	,462	81,546	1	70	,000
P/E	,921	6,033	1	70	,017
P/B	1,000	,002	1	70	,961

The results of the table above show that of all 10 variables included in the model, 5 variables when considered separately are capable of distinguishing between 2 groups. These are the variables ROA, ROE, EPS, Current Ratio, and Quick Ratio.

### 3.2. The shortened Z-Score model for real estate enterprises is listed on the Ho Chi Minh City and Hanoi stock exchanges.

In this section, we conduct a closer test of these 5 variables to form a reduced function and check whether the correct ratio of this new model is more accurate. The analysis steps are: (1) Group variance testing; (2) Group average accreditation; (3) Normalized Canonical coefficient; (4) Structural correlation coefficient; (5) Canonical coefficient is not normalized; (6) Classification results.

#### ➤ Group variance verification

**Bảng 3.2. Overall test of variance of two groups**

Dependency variable Z	
Overall variance test of two groups (Box's M)	
F-value	9,049
Probability	0,000

(Source: Author's Data Processing)

Often, researchers want to retain the hypothesis that variance between groups is equal so that their study stands. For 5 selective variables, the value  $F = 9.049$  and the p-value is recorded 0.000. We have grounds to reject the  $H_0$  hypothesis, i.e. the variance of the 2 groups is different. However, with a sufficiently large sample size, the variance of the two groups is not considered too important (Burns, 2008).

**Table 3.3: Specific values**

Eigenvalues				
Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	2,674 <sup>a</sup>	100,0	100,0	,853

a. First 1 canonical discriminant functions were used in the analysis.

(Source: Author's Data Processing)

The results from above show that a specific value of 2.674 represents a very good distinguishability of the newly formed function and it accounts for 100% of the variance that explains the cause. Also, the value of the correlation coefficient between the dependent variable Z and the selective new variables is 0.853.

This is quite a high value when the perfect correlation value is 1,000. The square of this coefficient,  $(0.853)^2 = 0.7276$ , shows that 72.76% of the variance of the dependent variable (Z-score) is explained by this model. This proves that the newly formed function also has good distinguishability.

➤ **Group average accreditation**

**Table 3.4: Group average inspection**

Wilks' Lambda				
Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	,272	87,838	5	,000

(Source: Author's Data Processing)

We have enough statistical evidence to refute the H0 hypothesis that the average overall of the differentiated function is equal, or in other words we conclude that the average groups have significant distinctions.

➤ **Normalized Canonical Factor**

As mentioned above, the Canonical coefficient normalizes the importance of variables through the absolute magnitude of the normalization coefficient of each variable. With five new variables, normalized Canonical coefficient values are presented in the following table.

**Table 3.5: 5-variable normalized canonical coefficients**

Discriminant Function Coefficients	
	Function
	1
Current Ratio	,249
Quick Ratio	-,053
ROA	,484
ROE	,909
EPS	-,244

(Source: Author's Data Processing)

➤ **Structural correlation coefficient**

**Table 3.6: 5-variable structural correlation coefficient**

Structure Matrix	
	Function
	1
ROE	,859
ROA	,704
EPS	,660
Current Ratio	,198
Quick Ratio	,181

(Source: Author's Data Processing)

The above structural correlation coefficient is arranged in descending order of absolute values of independent variables. The structural correlation coefficient of the above five variables has 5 variables that are all positive, proving that these 5 variables have a same-dimensional relationship with the dependent variable Z.

➤ **Unnormalized Canonical coefficients**



Similar to normalized canonical coefficients, unnormalized canonical coefficients indicate the contribution of each independent variable to the distinguishing function of the master function. These coefficients can be used to evaluate the special contributions of each variable and as such, can be interpreted as unnormalized beta coefficients in multivariate regression equations. Since the non-normalized canonical coefficient is just as significant as the unnormalized beta coefficient in keeping the raw values of the variable for calculation, the study proceeded to build a new distinguishing function on the basis of this coefficient. Details are presented in the following table:

**Table 3.7: 5-variable unnormalized canonical coefficients**

Canonical Discriminant Function Coefficients	
	Function
	1
Current Ratio	,191
Quick Ratio	-,046
ROA	,147
ROE	,195
EPS	-,173
(Constant)	-2,471

(Source: Author's Data Processing)

Thus, the newly built model takes the form:

$$Z = 0,191X1 - 0,046X2 + 0,147X6 + 0,195X7 - 0,173X8 - 2,471 \quad (3.2)$$

➤ **Classification results**

**Table 3.8. Classification Results<sup>a,c</sup>**

		Business ratings	Predicted Group Membership		Total
			bad	good	
<b>Initial sample</b>	Count	bad	47	0	47
		good	3	22	25
	%	bad	100,0	,0	100,0
		good	12,0	88,0	100,0
<b>Cross-examination</b>	Count	bad	46	1	47
		good	3	22	25
	%	bad	97,9	2,1	100,0
		good	12,0	88,0	100,0

In the initial sample section, businesses are categorized by function (3.3). During cross-examination, the SPSS software will develop a distinct function that will be separated from the review process. This process is repeated with each of the remaining cases. The cross-examination process proved more credible because of the argument that cases under classification should not be used as part of the classification process (Burns, 2008).

When we randomly categorize a new business into one of the two groups, we get the correct rate at 50%. The results help us improve the accuracy of random classification by up to 44.4%. In fact, distinguishability only needs to be improved to 25% is acceptable (Hoang Trong, 2008).

**Table 3.9. Functions at Group Centroids**

Business ratings	Function
	1
Bad	-1,176
Good	2,211

Thus the Z-value is in the range (-1.176 ; 2.211)

If  $Z \geq 2.211$ , then the business is in the comfort zone.

If  $-1.176 \leq Z \leq 2.211$ , then the enterprise is in the bankruptcy warning zone.

If  $Z \leq -0.969$ , then the enterprise is in the zone at risk of bankruptcy.

#### 4. CONCLUSION

The study has achieved its predetermined objective of finding the five indicators ROA, ROE, self-financing ratio, debt ratio, and cash payment ratio that are required input components to assess the risk level of real estate firms listed on the Vietnam Stock Exchange. From there, a Z-model based on 5 independent variables may be constructed, and defined Z-value intervals can be used to group the enterprise's risk level. The model's accuracy was 94.4%, a respectably high estimation result that served as a foundation for later research on variable selection and reduced variable combination selection.

The research contributes more theoretical groundwork and empirical research for subjects in the economy, especially investors, to have a basis for choosing real estate securities codes suitable to their investment preferences (high risk, low risk), given that the real estate industry is currently experiencing many difficulties.

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## TESTING OF FAMA-FRENCH THREE-FACTOR MODEL FOR REAL ESTATE STOCKS IN VIETNAM

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**ABSTRACT:** *This study provides empirical evidence for the applicability of the three-factor Fama - French model for real estate stocks listed on the Vietnam stock market with weekly data for the period from January 2017 to December 2021. The empirical results show that although CAPM is able to capture the section of average returns, the three-factor Fama – French model with size and value factor can do the job better and hence is useful in pricing the assets. In details, the market risk premium is positively correlated with the return of the portfolio, indicating that high return is a reward of high risk taking. The size premium is positively correlated with the portfolio returns of small firm stocks. The value premium (HML) has a positive coefficient for the portfolios having high BE/ME ratio and negative coefficient for the portfolios having low BE/ME ratio.*

*Keywords:* Fama - French 3 factor model; real estate stocks; stock rate of return.

### 1. INTRODUCTION

In 2021, real estate stocks account for 27% of market capitalization, which proves the importance of real estate stocks on the Vietnam stock market. Investors enter into stock market with an aim to generate high returns but it comes at a cost in the form of risk. In order to minimize risk, investors must estimate the rate of return of investment portfolio. Measuring the return of an individual stock is not easy, making it even harder to measure the return of an entire portfolio. Therefore, researchers around the world have developed models to estimate the rate of return of investment portfolios. A typical example is the Capital Asset Pricing Model (CAPM), which was designed in the 1960s by William Sharpe. The model is expected as an effective method to measure the expected returns of individual stock and portfolio. The increasingly complex development of the market, however, has gradually reduced the accuracy and efficiency of CAPM model. Meanwhile, the Fama - French model, which was developed in 1993, is considered as an improvement. The size premium and the value premium variable are added to increase efficiency in measuring the change in return of the portfolio. This paper empirically examines the standard CAPM along with the Fama-French three-factor model for the Vietnam real estate stocks. We also use the Fama–French three-factor model to measure and explain the change in returns of stocks in the Vietnamese real estate industry.

### 2. LITERATURE REVIEW

Maroney, Protopapadakis (2002) tested the Fama - French model on stock markets in 7 countries including Australia, Canada, Germany, France, Japan, the U.K and the U.S. The effects of firm size and value on stock returns were found in all markets. The test results showed that the effects of firm size and the BE/ME ratio are international characteristics.

Nima Billou (2004) compared and tested the effectiveness of CAPM and Fama – French three-factor models. The effectiveness was measured based on alphas and the mean of the absolute value of alphas. The

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results of the study showed that size premium variable and the value premium variable are very influential on the U.S stock market.

Elhaj Walid, Elhaj Ahlem (2007) tested the Fama-French model on the Tokyo Stock Exchange (TSE) between January 2002 and September 2007. The firm size factor and the rate of return were demonstrated to have a negative relationship while that of value factor and the rate of return was positive.

Al-Mwalla, Karasneh (2011) tested the efficiency of the Fama-French three-factor model on the Amman stock market. The study found a very strong and positive effect of the size and company value to the return on stock in Jordan.

Ferdian (2011) applied a three-factor model to measure the profitability of stocks on the Indonesian stock market. The research results show that in addition to beta coefficient (market risk), company size and value were also factors affecting the return of stocks. Market risk still remained the most important factor in the model.

V Eraslan (2013) has tested the Fama - French model on 365 stocks on ISE in the period 1/2003 - 12/2010. The research results show that the model is suitable in explaining the change of stock returns. The SMB scale offset variable is effective for small and medium sized portfolio returns. Meanwhile, the HML variable is effective with high BE/ME portfolio returns.

Vuong & Ho (2008) applied the Fama - French three-factor model to explore the factors affecting the profitability of stocks on HOSE. The research result showed that the portfolio of small-sized stocks has a higher return than the portfolio of large-sized stocks. This result was completely consistent with previous studies conducted on the stock market in developing countries. However, when considering the HML factor, this study had opposite results with the conclusion of Fama-French (1993). Specifically, the BE/ME ratio was negatively correlated with the returns of stocks.

Tran (2010) tested the suitability of the Fama-French 3-factor model for stocks listed on HOSE in the period from 12/2004 to 12/2007. The results showed that the factor of market return and the ratio of book value to market value (HML) were positively correlated with the return of stocks. However, in contrast to the results of studies conducted abroad, the size factor (SMB) is negatively correlated with the return of stocks, which made the return of large-cap stocks was high than the return on small-cap stocks.

In general, there have been many studies testing the efficiency of the three-factor Fama - French model in estimating the return on stocks and investment portfolios in Vietnam and abroad. However, as far as we may know, until now, there is no study in testing of Fama-French three-factor model for real estate stocks in Vietnam. This study makes an attempt to fill that gap in research for Vietnam stock market.

### 3. THEORETICAL MODEL

By conducting an empirical research in the period 1963 - 1990, Eugene Fama and Kenneth French found that beta was not the only variable that affected the return on stock or portfolio. They concentrated on two groups of stocks that tend to outperform the market. The first group was for small-cap (known as small-sized) stocks and the second one was for stock having high BE/ME ratio. Fama - French model was considered as an improvement of CAPM. On the basis of CAPM, Fama and French (1993) added the variables of firm size (measured by market capitalization) and company valuation (measured by book value to market value - BE/ME) to model to measure and explain changes in the return on stocks and portfolios. This model is called Fama - French Three-Factor Model. The model is expressed as:

$$R_i = R_f + \beta_i(R_m - R_f) + s_iSMB + h_iHML$$

In this equation:

$R_i$ : The return of stock  $i$ ;

$R_m$ : The market return;

$R_f$ : Risk free rate;

SMB (Small Minus Big): The size premium

HML (High Minus Low): The value premium

$s_p, h_i$ : the sensitivity coefficients of SMB and HML factors.

### 3. DATA

Prices of real estate stocks and Vn-Index are collected from the Website of Ho Chi Minh Stock Exchange between January 2017 and December 2021.

Book value of shares is determined based on equity and number of shares outstanding. Market capitalization is calculated based on number of shares outstanding and market price at the end of each year from 2017 to 2021. This data is obtained from the consolidated financial statements of real estate firms listed on HOSE. The Government bond yield is taken as the proxy for the Vietnam risk free rate which is collected during the period between January 2017 and December 2021 from the website <http://investing.com/>.

### 4. METHODOLOGY

The stock portfolios are built on the basis of two factors: company size and BE/ME ratio (Fama, 1993). The six categories: SM, SH, SL, BM, BL, BH are denoted as follows:

**Table 1: Portfolio construction to determine Fama-French Factors**

Size	BE/ME ratio		
	L(30%)	M (40%)	H (30%)
S	SL	SM	SH
B	BL	BM	BH

+ SMB (Small minus big) is the average return on small portfolios minus the average return on big portfolios:  $SMB = 1/3(SH + SM + SL) - 1/3(BH + BM + BL)$

+ HML (High minus low) is the average return on five value portfolios minus the average return on five growth portfolios.):  $HML = 1/2(SH + BH) - 1/2(SL + BL)$

+ Return of stock: The closing prices of stock are used to calculate the weekly return:

$$R_{i,t} = \ln(P_t/P_{t-1})$$

Where:

- $R_{i,t}$ : weekly return of stock  $i$
- $P_t$ : price of stock  $i$  for the last weekday
- $P_{t-1}$ : price of stock  $i$  for the first weekday

### 6. RESULTS

During the research period, there is no stock matching up to the portfolio BH (containing big-sized and high BE/ME ratio stocks). Therefore, I will conduct regressions of 5 portfolios including: BL, BM, SL, SM, SH.

#### 6.1. Regression results

The article uses the Augmented Dickey - Fuller test method (ADF, 1979) to check the existence of a unit root in all data series. At the 5% level of significance, the data series of variables are stationary.

**Table 2: Augmented Dickey – Fuller test results**

Variables	Augmented Dickey – Fuller test statistic	
	t - statistic	P – value
$R_m - R_f$	-11.15018	0.0000
SMB	-14.76527	0.0000
HML	-13.67195	0.0000
$BL - R_f$	-3.150877	0.0242
$BM - R_f$	-2.999590	0.0363
$SL - R_f$	-12.16028	0.0000
$SM - R_f$	-15.19780	0.0000
$SH - R_f$	-11.20770	0.0000
Test critical values	1% level	-3.455990
	5% level	-2.872720
	10% level	-2.572802

*(Source: Author's Data Analysis Results)*

Multicollinearity test is carried out to ensure that the independent variables can simultaneously explain the change of the dependent variable.

**Table 3: Correlation matrix between variables**

	$R_m - R_f$	HML	SMB
$R_m - R$	1.000000	0.365047	0.247891
HML	0.365047	1.000000	-0.124364
SMB	0.247891	-0.124364	1.000000

*(Source: Author's Data Analysis Results)*

The correlation coefficients between the explanatory factors are relatively low, none of the correlation coefficients is greater than 0.8 - a certain level of multicollinearity (Kennedy 1985). Therefore, the model does not have multicollinearity.

Before explaining the estimation results, we will conduct the autocorrelation test and error variance test.

**Table 4: Breusch-Godfrey autocorrelation test results**

No	Portfolio	P – value	Conclusion
1	BL	0.747478	No autocorrelation
2	BM	0.304791	No autocorrelation
3	SL	0.989571	No autocorrelation
4	SM	0.993171	No autocorrelation
5	SH	0.249278	No autocorrelation

*(Source: Author's Data Analysis Results)***Table 5: White test results**

No	Portfolio	P – value	Conclusion
1	BL	0.000002	Presence of heteroskedasticity
2	BM	0.003905	Presence of heteroskedasticity

3	SL	0.000071	Presence of heteroskedasticity
4	SM	0.000000	Presence of heteroskedasticity
5	SH	0.000001	Presence of heteroskedasticity

(Source: Author's Data Analysis Results)

The results of the Breush Godfrey Lagrange Multiplier test show that portfolios do not exist autocorrelation. However, all variances of the errors are not constant (Table 5). In order to fix this phenomenon, the author used the Robust Standard Errors Model (White 2008). This model accepts the variable variance, but the coefficients are recalculated without using the constant-variance hypothesis. The results are presented in Table 6.

**Table 6: Robust Standard Errors Model**

Variables	BL	BM	SL	SM	SH
Constant	0.017573*** (9.89)	0.0224*** (8.824)	0.0038*** (3.517)	-0.0148*** (7.236)	0.0213*** (9.716)
$R_m - R_f$	0.4918*** (10.286)	0.6833*** (10.151)	0.1211*** (3.995)	0.4411*** (10.747)	0.6129*** (10.290)
SMB	-0.2087*** (-3.613)	-0.0373 (-0.446)	1.1149*** (26.112)	0.7330*** (12.411)	0.9062*** (13.648)
HML	-0.4644*** (-8.247)	-0.0718 (-0.9345)	-1.0199*** (-29.303)	-0.032 (-0.5411)	0.5156*** (7.173)
R – squared	0.62	0.68	0.92	0.73	0.78
P-value	0.0000	0.0000	0.0000	0.0000	0.0000
Number of observations	260	260	260	260	260

Note \*\*\*, \*\*, \*: Significance level of 1%, 5% and 10%

(Source: Author's Data Analysis Results)

Most of coefficients are statically significant at 1% level. In terms of coefficient signs, the variable  $R_m - R_f$  has positive coefficients in all 5 portfolios. The variable SMB has positive coefficients in the small-sized portfolios SL, SM, SH, but those coefficients in the big-sized portfolios BL, BM are negative. The variable HML has positive coefficients in 4 out of 5 portfolios, but these coefficients in BM and SM are not statistically significant.

**6.2. Compare the fit of the capital asset pricing model (CAPM) and the Fama-French three-factor model**

**Table 7: Comparing R<sup>2</sup> of CAPM and Fama – French**

Portfolio	R-squared of CAPM	R-squared of Fama – French model
BL	0.38	0.62
BM	0.31	0.68
SL	0.17	0.92
SM	0.07	0.73
SH	0.28	0.78

(Source: Author's Data Analysis Results)

R-squared of CAPM is quite low, ranges from 0.07 to 0.3. It means CAPM only explains 7% - 38% of the variation of the returns of real estate stocks. Meanwhile, this figure in Fama - French model ranges from 0.62 - 0.92, the factors in this model explain 62% - 92% of the variation of the returns of real estate stocks.



## 7. DISCUSS RESULTS

### 7.1. Discussion on the applicability of Fama – French three – factor model on Vietnamese real estate stocks

Compared with the traditional CAPM model, the addition of the variables SMB (difference between average returns of small-sized and large-sized portfolios) and HML (difference between average returns of portfolios with high BE/ME ratio and those with low BE/ME ratio) significantly increased the R-squared value. Especially, the highest adjusted R-squared of CAPM is 38% while this figure of Fama-French model has risen to 92%. It is considered as a great improvement in the measurement of the expected return of stocks and investment portfolios. The Fama-French three – factor model is proved to be more effective than the CAPM in measuring and explaining the variation of the returns of Vietnamese real estate stocks. This result is consistent with Nima Billou (2004), Gregory Connor and Sanjay Sehgal (2001).

### 7.2. Discussion on regression results

The market risk premium ( $R_m - R_f$ ) has positive coefficients in all 5 portfolios ranging from 0.12 (SL portfolio) to 0.68 (BM portfolio). In addition, all categories are statistically significant at the 1% level. This shows that the market risk premium is positively correlated with stock returns and investment portfolio returns. This result is completely consistent with many previous studies such as: Maroney and Protopapadakis (2002), Elhaj Walid and Elhaj Ahlem (2007), Nima Billou (2004), L. Bretschger and F. Lechthaler (2012).

The size premium (SMB) has negative coefficients in 2 regression models with big-sized portfolios: BL (-0.2087) and BM (-0.0373), but positive coefficients in 3 regression models with small capitalization portfolios: SL (1.1149), SM (0.7330), SH (0.9062). All coefficients are statistically significant at the 1% level. This shows that the size premium is positively correlated with the rate of return of small-sized firms and negatively correlated with the rate of return of firms having high market capitalization. These results coincide with those of Fama and French (1993), V Eraslan (2013), L. Bretschger and F. Lechthaler (2012), but disagree with those of Tran Thi Hai Ly (2010). This may due to the characteristics of the Vietnamese market where big-sized companies often have a high state ownership rate.

The value premium (HML) has a positive coefficient in the regression model with portfolio SH which has a high BE/ME ratio and correlates inversely with the returns of the portfolio having low BE/ME ratio. These results are similar to those of Fama – French (1993), V Eraslan (2013), Vuong Duc Hoang Quan and Ho Thi Hue (2008).

By comparing the appropriateness of the capital asset pricing model (CAPM) and the Fama - French 3-factor model, it can be determined that the Fama - French model is more suitable in explaining the variation in the stock rates of return in the Vietnamese real estate industry. However, some assumptions of the Fama - French model are no longer relevant, which leads to potential misleading results. Besides, in Vietnamese stock market, it is hard to achieve the market efficiency, which reduces the applicability of asset pricing models.

## 8. CONCLUSION

This study has provided empirical evidence on the appropriateness of the Fama – French 3-factor model in explaining the rate of return of real estate stocks listed on the Vietnam market in the period from January 2017 to December 2021. In addition, the study also shows that the Fama - French model is more effective than the CAPM in measuring as well as explaining the change in the return of stock.

In the Fama- French three-factor model, the market risk premium is positively correlated with the returns of the portfolio, indicating that high return is a reward of high risk taking. The size premium is

correlated positively and negatively with the returns of small and the returns of small large firms respectively. The value premium is positively correlated with high BE/ME portfolios and negatively correlated with low BE/ME returns. Investors, therefore, should prioritize putting more small-cap value and BE/ME stocks into the portfolio in order to outperform market return in long-term.

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## EVALUATING THE EFFICIENCY OF COMMERCIAL BANKS IN VIETNAM: AN APPLICATION USING DATA ENVELOPMENT ANALYSIS (DEA)

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**ABSTRACT:** *This paper uses the data envelopment analysis (DEA) method to evaluate the performance of 30 commercial banks in 2021. It was a challenging year for the banking sector and the economy in Vietnam due to the significant impact of the Covid-19 pandemic. Specifically, this study uses three input variables (total net fixed assets, total expenses for employees, and raised capital) and two output variables (interest and cash equivalents and non-interest income and equivalents) to estimate the DEA efficiency score of Vietnamese commercial banks. Results show that the group of five banks with the highest efficiency were AGRB, OCB, NAB, VAB, and PGB. Thus, among these banks, four are joint-stock commercial banks and one is state-owned commercial bank. Despite the Covid-19 period, the average operational efficiency of the whole banking system remained high, reaching 81.02%. This study proved that Vietnamese commercial banks operated efficiently and reasonably utilized input resources in 2021. In other words, it also revealed that banks wasted approximately 18.98% of their inputs, indicating that many banks are still operating inefficiently.*

**Keywords:** *Covid-19, Commercial banks, Data Envelopment, Operational Efficiency.*

### 1. INTRODUCTION

Globalization, international economic integration, trade liberalization, and the continuous development of science and technology are prominent trends in the contemporary world economy. These conditions provide opportunities for developing countries but intensify competition in various economic sectors, including the finance and banking sector. Most commercial banks in Vietnam have small scales, limited financial capacity, management capabilities, and technological expertise compared to foreign banks. Additionally, the unpredictable development of the Covid-19 pandemic, along with the emergence of new variants, has further complicated the economic prospects and revealed certain aspects that impact the operations of banks. For instance, capital mobilization in 2020 increased by only 0.47% (a significant decrease compared to the 2.76% growth in 2019). As of the end of 2020, the credit outstanding balance of the banking system towards the economy increased by only 1.48% compared to the end of 2019, the lowest in nearly 15 years. The gross non-performing loan ratio also significantly increased to 7.31% at the end of 2021 from 5.1% at the end of 2020 (State Bank of Vietnam Annual Reports, 2019-2021). Despite facing many challenges due to the pandemic, this is also an opportunity for commercial banks to reflect on the limitations in their operations and explore new directions that align with market demands to thrive.

Commercial banks play an essential role in the economy. The banking sector is a vital channel for capital allocation to support business activities. Banks also contribute to maintaining and stabilizing the macroeconomy, controlling inflation, restructuring the economy after the epidemic, etc. In addition, commercial banks have been building the economy. Independence and self-reliance are associated with proactive and active international integration and improving people's living standards. Therefore, the economy will develop if the banking system is stable, safe, and efficient.

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In conclusion, evaluating the efficiency of the banking system in 2021 is significant in addressing lingering issues, effectively utilizing existing resources, enhancing competitiveness, and making policy decisions to maximize profits for the banks. It also aids government regulatory bodies in supporting the creation of favourable conditions for improved bank operations.

## 2. RESEARCH OVERVIEW

Efficiency is a term used in many fields and has various perspectives regarding operational efficiency, including overall operational efficiency and the efficiency of commercial banks. In general, if a bank achieves maximum output results under the given input conditions by optimizing its utilization, it is considered efficient. This argument can be understood from the following aspects. Firstly, operational efficiency must reflect the level of success that businesses or banks achieve in allocating their usable inputs and producing outputs to meet predetermined goals. The more significant the difference between these two factors, the higher the efficiency. Secondly, it includes generating profits or minimizing costs to enhance competitiveness with other financial institutions. Thirdly, it encompasses the probability of a bank operating safely. Therefore, both global and Vietnamese studies have applied the Data Envelopment Analysis (DEA) method to evaluate the operational efficiency of commercial banks.

Barbara Casu and Claudia Giardone (2011) applied an intermediate approach and two models, Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA), to examine the relationship between competitiveness, concentration, and specific efficiency of commercial banks in the Euro area. The study found a non-linear relationship between competition and efficiency and other factors such as risk sensitivity, regulatory framework, and macroeconomic factors that could, directly and indirectly, influence this relationship. This could explain subsequent studies in the Euro area. Similarly, using the DEA model, Sherman and Gold (1985) assessed the operational efficiency of 14 bank branches in the United States. The study included three input variables: labour, workspace, and supply cost, and one output variable: the number of transactions. The research results showed that six branches operated less efficiently than other branches in the sample. Additionally, Miller and Noulas (1996) applied the Data Envelopment Analysis (DEA) method to estimate the efficiency of 201 large banks in the United States (banks with assets over 1 billion US dollars during the period of 1984-1990). Considering banks as intermediary organizations, the authors selected input variables such as total demand deposits, total time deposits, total interest expense, total interest paid, and output variables such as industrial loans, commercial loans, consumer loans, real estate loans, securities investments, interest income, and fee income. According to the authors, the average inefficiency (including pure inefficiency and scale inefficiency) of the 201 banks was over 5%. The research results also indicated that most banks with larger scales were experiencing decreasing efficiency as their scale increased.

Tran and Bhaiyat (2016) evaluated the efficiency of 31 Vietnamese commercial banks using the Data Envelopment Analysis (DEA) model for 2011-2014. The selected input variables were fixed assets, deposits, and employee expenses, while the output variables included loans, securities investments, and non-interest income. The analysis showed that the average technical efficiency of Vietnamese commercial banks was 87%, indicating that banks wasted 13% of their input resources. The average technical efficiency decreased in 2012 but then increased in subsequent years. In particular, the central and listed banks exhibited higher efficiency in their operations compared to non-listed commercial banks. The restructuring of banks during 2011-2015 yielded positive efficiency outcomes for some of the researched banks.

In addition, the Data Envelopment Analysis (DEA) model has also been extensively studied in Vietnam. Nguyen Thi Thu Thuong (2017) applied the DEA model to evaluate the efficiency of 21 banks

in Thai Nguyen province from 2011 to 2015. The selected input variables were deposits ( $X_1$ ), interest expenses for credit activities ( $X_2$ ), and expenses for other activities, including employee costs ( $X_3$ ). The output variables included loan amounts ( $Y_1$ ), income from credit activities ( $Y_2$ ), and income from other activities ( $Y_3$ ). The results showed that the banks utilized their input resources relatively efficiently, with an average technical efficiency score of 94%. The study also revealed that technological progress was the main factor contributing to changes in the Malmquist index. In addition to profitability/total assets, non-performing loans/total credit debt, and total assets, the number of enterprises positively impacted the technical efficiency of the banks in the province. In 2017, Tran Hoa Nha Truc applied the DEA model to evaluate the efficiency of Vietnamese commercial banks. The summarized results indicated an increasing trend in the efficiency of Vietnamese commercial banks during the period 2009-2012, followed by a gradual decline. The research results demonstrated that the business efficiency of Vietnamese commercial banks from 2009 to 2015 was relatively high. Factors reflecting the scale of bank operations contributed more to the overall operational efficiency than pure technical efficiency, suggesting that increasing the scale of operations would create conditions for improving operational efficiency. Using an intermediate approach, Ngo Dang Thanh (2010) also employed the DEA model to assess the resource utilization efficiency of 22 Vietnamese banks in 2008. The input variables in the study included salary expenses, interest expenses, and other equivalent expenses, while the output variables consisted of total assets, income from interest and equivalent sources, and other income. The study had the advantage of a larger sample size and a better selection of input and output variables compared to previous research, resulting in more specific and comprehensive evaluation results for the Vietnamese banking system.

Moreover, Thao and Quynh (2013) also conducted a study on the operational efficiency of Vietnamese commercial banks and used the DEA model with the following input variables: operating costs, interest expenses, and other similar costs; the output variables included interest income and other comparable earnings, and other income from business activities. The research results for 39 banks between 2008 and 2012 showed that the average technical efficiency (TE) was 92.84%, the average pure technical efficiency (PTE) was 96.2%, and the average scale efficiency (SE) was 96.56%. This indicates that scale efficiency contributes more to overall efficiency than pure technical efficiency, and the operational activities of the commercial banks did not achieve the expected efficiency. Finally, we cannot overlook the study by Nguyen (2008), who examined SFA method to assess factors influencing operational efficiency and DEA method to measure operational efficiency for 32 banks in Vietnam, including five state-owned banks, 4 joint-venture banks, and 23 commercial banks between 2001 and 2005. The research utilized an intermediary approach with selected variables in the DEA model, including two output variables and three input variables. The input variables were net fixed assets, total employee expenses, and total mobilized capital, while the output variables were interest income and equivalent earnings and non-interest income and equivalent earnings. This study is considered comprehensive in terms of the Vietnamese banking system and represents a new direction for researching operational efficiency methods in Vietnam today.

In conclusion, it is evident that the Data Envelopment Analysis (DEA) method has been widely employed in both domestic and international research to evaluate the operational efficiency of banks. However, most authors have focused on an intermediary approach, considering banks as financial intermediaries between depositors and borrowers and the selection of input and output variables based on the collected data sources. Each study proposes solutions to improve the operational efficiency of banks, thereby contributing to the sustainable development of the banking industry. This research will apply the DEA method to evaluate the operational efficiency of Vietnamese banks in 2021, which was a challenging year due to the impact

of Covid-19. The research sample will include 1 state-owned bank and 29 commercial banks representing the entire Vietnamese banking system, to identify new insights and directions in this period. Additionally, the DEA model allows for determining the relative efficiency of operating units within a complex system. It provides a comprehensive analysis of the relative efficiency of decision-making units (DMUs) with multiple inputs and outputs by estimating each DMU and its relative efficiency based on efficiency margins.

### **3. RESEARCH DATA AND METHODS**

#### **3.1. Research data**

The research data is collected from the financial statements of 30 Vietnamese commercial banks (Appendix 1) and the annual report of the State Bank for 2019-2021. There are currently 46 commercial banks in Vietnam, including 4 state-owned commercial banks, 31 joint-stock commercial banks, 9 banks with 100% foreign capital, and 2 joint-venture banks. Thus, the research sample, consisting of 29 joint stock commercial banks and 1 state-owned commercial bank, partly represents the entire Vietnamese commercial banking system in evaluating the performance of banks.

#### **3.2. Research Methods**

This study utilizes the Data Envelopment Analysis (DEA) model, which originated in 1978 with the “initiative” of Charnes, Cooper, and Rhodes. However, its foundation can be traced back more than 20 years earlier. In 1957, Farrell introduced the concept of applying the Production Possibility Frontier (PPF) as a criterion for assessing (relative) efficiency among companies within the same industry. According to this concept, companies that reach the limit are considered efficient (or more efficient), while those that fall below the PPF are deemed inefficient (compared to other companies). The DEA method (1978) later applied non-parametric linear optimization to construct the PPF based on known data about a specific group of companies (decision-making units - DMUs) and calculated efficiency scores for those companies. In 1984, Banker, Charnes, and Cooper improved the model by incorporating returns to scale in the calculations, providing a more specific view of the efficiency of analyzed DMUs. Since then, the DEA model has been widely applied and developed in analyzing efficiency/performance in various fields such as banking, insurance, education, healthcare, etc. According to the DEA model, the most efficient operating unit will have an efficiency score of 1, while the scores of inefficient units are determined by projecting them onto the efficiency frontier.

The principles of calculating and comparing the efficiency of DMUs are based on effectiveness, performance, or productivity measures used to compute/compare the corresponding outputs to the given inputs. For example, labour productivity can be calculated as the ratio of output (number of products) to labour input; return on investment can be measured as profit divided by capital invested, and so on. However, in practice, a business or production unit (DMU) typically uses a combination of input factors to obtain a range of output factors (multivariate model), and therefore, evaluating the efficiency of that DMU requires multiple different efficiency indicators. Because these efficiency indicators are constructed based on various factors in terms of nature and measurement, assessing the overall performance of each DMU and comparing between DMUs requires a common monetary measure.

The combined effect applied to multiple variables is calculated based on the individual effects as follows:

$$EF = 1 \text{ Output} / 1 \text{ Input}$$

$$EFF = \text{Total Outputs} / \text{Total Inputs}$$

If assuming a DMU utilizes  $m$  input factors  $x$  to produce  $n$  output factors  $y$  through a specific combination of inputs and outputs according to two corresponding weights  $v$  and  $u$ , then EFF can be calculated as follows:

$$EFF = \frac{u_1*y_1 + u_2*y_2 + \dots + u_n*y_n}{v_1*x_1 + v_2*x_2 + \dots + v_m*x_m}$$

EFF is the absolute efficiency of the DMUs. With the above formula, we can calculate the efficiency of each DMU sequentially. In cases where prices are not determined, it can be assumed that one input variable  $x_i$  or one output variable  $y_j$  will be assigned to a weight  $u_i$  or  $v_j$  based on the importance level of the input or output variable for each DMU. However, each DMU will have different evaluations regarding the importance of each input and output variable. Therefore, each DMU will now be different in terms of  $u$ ,  $v$ ,  $x$ , and  $y$ .

$$\text{Max}_{u,v} EFF_0$$

Within the conditions of:

$$EFF_0 = \frac{\sum U_{0m} Y_{0m}}{\sum V_{0k} X_{0k}} \text{ (DMU Efficiency score)}$$

$$EFF_j = \frac{\sum U_{jm} Y_{jm}}{\sum V_{jk} X_{jk}} \text{ (Efficiency score of all DMUs does not exceed 1)}$$

$$u_m, v_k \geq 0 \text{ (The "hidden prices" are non-negative)}$$

When applied to the efficiency calculation of an industry or a group of DMUs, it is necessary to study the set of all maximum efficient points, which will form the PPF curve. According to this curve, the DMUs lying on the PPF will have 100% efficiency, while other DMUs will have an efficiency lower than 100%. This represents the relative efficiency among the DMUs, different from the absolute efficiency determined by the formula mentioned above. However, this formula also serves as a basis for constructing the Production Frontier (PF) curve according to the following principle.

- PF is the set of all maximum efficient points of the DMUs, so it is necessary to determine these maximum efficient points.

- The efficiency calculation formula mentioned earlier shows that each DMU will have an optimal set of weights  $u$  and  $v$  to maximize its own efficiency. Therefore, it is necessary to find the optimal weights  $u$  and  $v$  for each DMU. This can be achieved by solving an optimization problem for each DMU according to the formula:

$$\text{Max EFF} (u, v)$$

Under the condition:  $EFF \leq 1$  for all DMUs (including the DMU under consideration). The study proceeds with other DMUs to find the optimal weights as well as the maximum efficient points for each DMU. With this calculation, the obtained PF curve will represent the best practice frontier, constructed based on the available actual data, because it is an optimization function that can be fully achieved by changing the weights  $u$  and  $v$ . This is different from regression functions, which are only estimates. The PF curve will form an enveloping (boundary) curve, and the observed actual data points lie within it. Therefore, the calculation model described above is known as the Data Envelopment Analysis (DEA). Particularly, the study uses the input-oriented constant return to scale DEA model to estimate the efficiency score of Vietnamese commercial banks.

*Choosing input and output variables:* An important characteristic of the banking industry is that it involves multiple inputs and outputs, making it crucial to determine the reasonable selection of inputs and

outputs for banks. However, there is currently no complete or clear theory or definition regarding identifying inputs and outputs for banks. According to Berger and Humphrey (1997), an intermediary approach may be the most appropriate for evaluating the operational efficiency of financial institutions because this approach considers both interest expenses, which typically account for 1/3 to 1/2 of the total operating costs of banks. Based on the collected data and suggestions from research findings by authors within and outside the country, the study has selected the following variables for the research model.  $K$  is the total net fixed assets of a commercial bank, which refers to the net book value of the fixed assets owned by the bank.  $L$  is total expenses for employees. DEPO is raised capital of commercial bank.  $Y_1$  and  $Y_2$  are interest and cash equivalents and non-interest income and equivalents, respectively.

Input variables		Output variables	
K	Total net fixed assets	$Y_1$	Interest and cash equivalents
L	Total expenses for employees	$Y_2$	Non-interest income and equivalents
DEPO	Raised capital		

#### 4. RESEARCH RESULTS

##### 4.1. Overview of Vietnamese commercial banks

- Charter capital

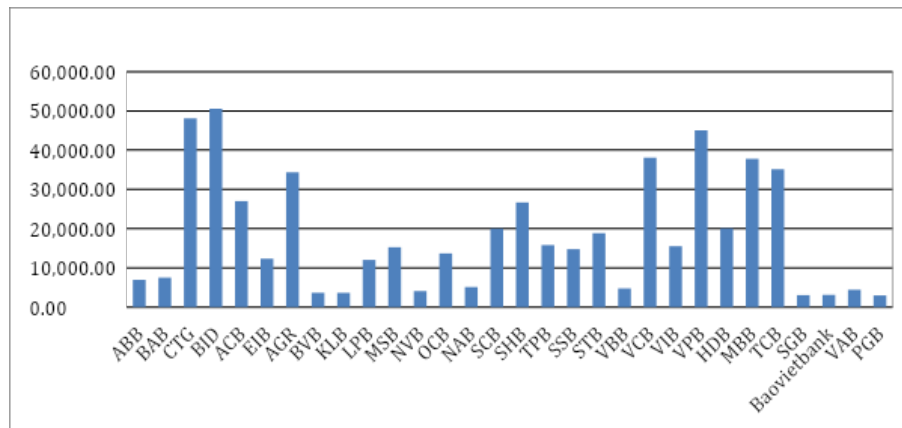


Figure 1: Charter capital of banks (Billion VND)

(Source: Author's summary)

As shown in the table above, the top 3 banks in terms of equity capital are BID, CTG, and VPB. In the first quarter of 2020, BID maintained its first position among the top 10 banks with the largest equity capital in the system, with nearly 40,220 billion VND, remaining unchanged from the end of 2020 to the end of 2021 at 48,057.51 billion VND. CTG, with an equity capital of 48,057.51 billion VND, held the second position, which is quite normal as it is one of the four major banks in terms of total assets. The third position is not held by the two giants VCB and AGR, but by VPB (45,056.93 billion VND). In 2021, VPB increased its charter capital from over 25,000 billion VND to 45,000 billion VND through a stock dividend at a rate of 80%. In 2022, VPB continued to plan a substantial increase in equity capital to nearly 80,000 billion VND through private placement for foreign investors and dividend payment or bonus shares from owner's equity to become the bank's largest equity capital.

On November 14, 2019, the Vietnamese Government issued Decree No. 86/2019/ND-CP regulating the legal capital of credit institutions and branches of foreign banks. The minimum legal capital of commercial banks is 3,000 billion VND. Based on Clause 3, Article 7, Circular 22/2019/NHNN, the charter capital must



not be lower than the legal capital. The order of 8 banks from low to high in terms of equity capital are PGB, SGB, Baovietbank, KLB, BVB, NVB, NAV, VBB, respectively. Despite complying with the regulations of banks, maintaining equity capital below 5,000 billion VND is a significant obstacle to developing asset scale according to regulations, ensuring the minimum capital adequacy ratio for expanding market share and operations. While there are no banks with equity capital below 3,000 billion VND, the scale of these banks is still relatively small compared to banks in the region and globally.

- **Non-performing loan ratio**

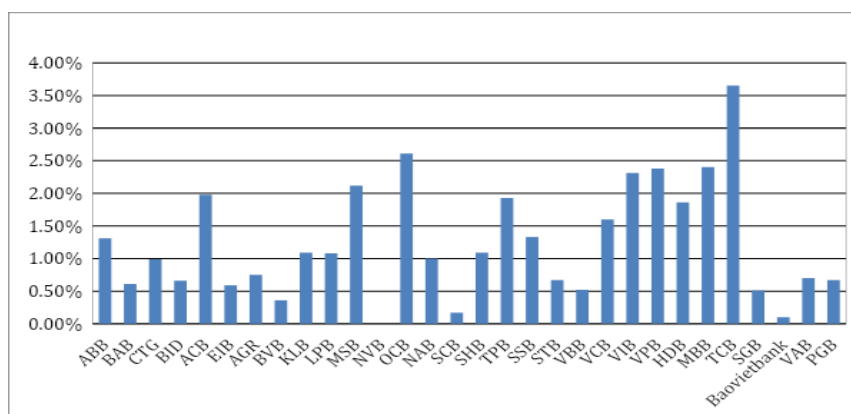
**Table 1: Non-performing loan (NPL) ratio of banks in 2021**

No.	DMUs	NPL	No.	DMUs	NPL	No.	DMUs	NPL
1	Baovietbank	4.94%	11	EIB	1.96%	21	OCB	1.32%
2	VPB	4.57%	12	KLB	1.89%	22	CTG	1.26%
3	VBB	3.65%	13	VAB	1.89%	23	SCB	1.10%
4	NVB	3.00%	14	MSB	1.74%	24	BID	1.00%
5	BVB	2.53%	15	SHB	1.69%	25	MBB	0.90%
6	PGB	2.52%	16	SSB	1.65%	26	TPB	0.82%
7	ABB	2.34%	17	HDB	1.65%	27	BAB	0.77%
8	VIB	2.32%	18	NAB	1.57%	28	ACB	0.77%
9	AGRB	2.04%	19	STB	1.50%	29	TCB	0.66%
10	SGB	1.97%	20	LPB	1.37%	30	VCB	0.64%

(Source: Author's summary)

From Table 1, Baovietbank has the highest non-performing loan ratio at 4.94%, followed by VPB and NVB, which are the second and third highest with non-performing loan ratios of 4.57% and 3.00%, respectively. The banks with the lowest non-performing loan ratios are VCB (0.64%), TCB (0.66%), BAB, and ACB (0.77%). The remaining banks also have relatively high non-performing loan ratios ranging from 0.8% to 4.57% as of the end of 2021. This causes a loss of capital for these banks, forcing them to pay interest on the capital leading to decreased profits. Moreover, the high overdue debt ratio undermines the credibility and trust in the financial strength of the banks, reduces their ability to mobilize capital, and, more seriously, may lead to liquidity risks, pushing the banks to the brink of bankruptcy and threatening the stability of the entire banking system. Depositors also risk not recovering their deposits and interest if the banks go bankrupt.

- **Return on asset (ROA)**



**Figure 2: ROA of Vietnamese commercial banks in 2021 (%)**

(Source: Author's summary)

As can be seen from Figure 2, TCB ranks first in terms of return on assets (ROA) at 3.65%, the highest among the Vietnamese banking system. It has increased by 0.55% compared to the same period in 2020 (3.1%). At this time, no member achieved a rate above 3%, and most were below the 2% threshold. The only five banks that achieved above 2% are OCB (2.61%), MBB (2.40%), VPB (2.38%), VIB (2.31%), and MSB (2.12%). The interesting point is that VCB, one of the three major state-owned banks, made it into the top 10 with a ROA of 1.60%. In contrast, CTG and BID lagged behind, ranking 17th and 22nd in the surveyed group of banks, with ROA in 2021 of 0.99% and 0.66%, respectively. We cannot overlook the three banks with ROA below 0.2%, which are NVB (0.002%), Baovietbank (0.10%), and SCB (0.17%), meaning they generate 0.2% or less profit from each unit of assets, indicating ineffective asset utilization. A high ROA often reflects efficient bank operations, a reasonable asset structure, and flexible allocation among different asset categories in response to economic fluctuations.

**4.2. Results of the Data Envelopment Analysis (DEA) model**

- **Descriptive statistics**

**Table 2: Descriptive statistics of variables (Unit: Billion VND)**

Variable name		Number of observations	Mean value	Standard deviation	Minimal value	Maximum value
Input 1	Total net fixed assets (K)	30	3,095.449	3,460.199	119.06	10,741.23
Input 2	Total employee expenditure (L)	30	3,374.516	3,505.096	305.68	14,111.2
Input 3	Raised Capital (DEPO)	30	319,364.4	418,465.9	18,105.49	1,542,504.38
Output 1	Interest and cash equivalents (Y1)	30	27,592.03	29,472.85	1,534.17	109,765.8
Output 2	Non-interest income and equivalents (Y2)	30	5,020.557	6,204.181	202.92	19,515.16

*(Source: Author's summary)*

AGR and BID have maintained the highest values for all 5 variables. AGR has 2 input variables and 1 output variable: total employee expenses (14,111.2 billion VND), mobilized capital (1,542,504.38 billion VND), and interest and equivalent income (109,765.8 billion VND). BID has 1 input variable and 1 output variable: net fixed assets (10,741.23 billion VND) and non-interest and equivalent income (19,515.16 billion VND). This is unsurprising as these two banks are among the top 4 banks in total assets. Regarding the smallest values: Baovietbank has 2 input variables: net fixed assets (119.06 billion VND) and total employee expenses (305.68 billion VND). SGB has 1 input variable and 1 output variable: mobilized capital (18,105.49 billion VND) and interest and equivalent income (1,534.17 billion VND). BVB has 1 output variable: non-interest and equivalent income (202.92 billion VND).

In addition, Vietnamese banks' primary income source is from mobilized capital. Most banks use mobilized capital for investment and business activities after establishing their capacity and reputation. Banks with appropriate strategies, credibility, and the ability to mobilize large capital are more likely to compete and expand their development rapidly, while the opposite is true. Furthermore, mobilized capital determines the payment capacity and high liquidity, ensuring credibility, developing business operations, engaging in competitive activities, and contributing to enhancing market position. The next source of income comes from interest and equivalent income, while non-interest income accounts for a very low proportion. This observation indicates the current focus of Vietnamese banks on credit income and the inefficient exploitation of non-interest income sources.

➤ **Data Envelopment Analysis (DEA)****Table 3: DEA model results**

No.	DMUs	Rank	Efficiency score	No.	DMUs	Rank	Efficiency score
1	AGRB	1	1	16	ACB	16	0.8162
2	OCB	1	1	17	SHB	17	0.7842
3	NAB	1	1	18	SGB	18	0.7814
4	VAB	1	1	19	EIB	19	0.7695
5	PGB	1	1	20	SCB	20	0.7477
6	TCB	6	1	21	MSB	21	0.7325
7	STB	7	1	22	BVB	22	0.7142
8	VCB	8	0.9759	23	Baovietbank	23	0.7111
9	BIDV	9	0.915	24	BAB	24	0.696
10	NVB	10	0.8754	25	ABB	25	0.6634
11	HDB	11	0.8652	26	CTG	26	0.6532
12	MBB	12	0.8541	27	SSB	27	0.6056
13	LPB	13	0.854	28	KLB	28	0.5768
14	TPB	14	0.8251	29	VPB	29	0.5713
15	VIB	15	0.8245	30	VBB	30	0.4949

*(Source: Author's summary)*

From Table 3, the highest efficiency in 2021 was achieved by five banks: AGRB, OCB, NAB, VAB, and PGB, all of which held the first position with an efficiency score of 1. However, despite having an efficiency score of 1, TCB and STB ranked second and third in the result table because the software rounded the number 1. The second group consists of nine banks with efficiency scores ranging from 0.8 to 0.98, indicating relatively high efficiency. The lowest group includes banks with efficiency scores ranging from 0.5 to 0.8. Among these banks, VBB had the lowest efficiency score of 0.4949.

In the first group, AGR is the only bank among Vietnam's "large four" banks to achieve optimal efficiency. In addition to having a large capital base and scale, the bank's indicators, such as ROA, ROE, and total profits, also rank between the 16th and 18th out of the 30 banks. VCB and BIDV lead in terms of capital base and consistently have their indicators in the Top 10, but they do not have optimal efficiency scores like the first group. Nevertheless, these two banks still rank 4th and 5th, which is relatively high, with efficiency scores of 0.9759 and 0.915, respectively. On the other hand, CTG falls into the lowest group, ranking 26th, far behind smaller-scale banks like OCB, NAB, VAB, PGB, TCB, and STB. With a restructuring plan allowed to span 10 years, but achieved in just 5 years, the distance to the target is no longer far. From 2017 to 2021, STB has recovered and resolved nearly 72,000 billion dong of non-performing loans and remaining assets, of which over 58,300 billion VND belongs to the plan, achieving nearly 68% of the overall plan. The on-balance-sheet non-performing loan ratio decreased from 6.81% to 1.47%. STB has continuously improved its system, elevated its management and operational capabilities, and significantly changed its business mindset to align with the market, contributing to the bank's efficient operations and sustainable growth. Despite a year of prolonged Covid-19 pandemic, TCB has maintained a very low non-performing loan ratio of 0.66%, with deposits reaching 314,752.53 billion VND in 2021, a 13.4% increase compared to the previous year-end (277,458.65 billion VND), and total operating income rising by 35.4% compared to the same period last year (Vietnam Technological and Commercial Joint Stock Bank's 2020 financial report). This observation reflects the success of the bank's management strategy and operational efficiency during this challenging period.

Therefore, it can be seen that not all banks with larger total assets operate more efficiently, and banks with smaller total assets are not necessarily unable to operate efficiently. From this, large banks need to assess their operational position and focus on further developing and improving operational efficiency. On the other hand, smaller banks need to address and enhance deficiencies in their systems, scale, management, and especially their business mindset to strive for optimal efficiency.

## 5. CONCLUSION

Regarding commercial banks' operational situation, registered capital reflects financial strength, ensures financial stability in banking operations, and builds public trust. The year 2021 marked significant milestones for the Vietnamese banking industry. According to statistics, the top three banks with the highest registered capital were BID, CTG, and VPB. While the registered capital of banks in the top 10 continuously increased and competed with each other, many Vietnamese commercial banks still have relatively small registered capital, limiting their ability to mobilize and supply credit to the entire economy. Typically, a bank is considered to be operating efficiently when its return on assets (ROA) is at least 0.9-1%. However, in 2021, as many as 14 banks had a ROA lower than 0.9%. This observation could result from non-performing investment or lending policies or high operating costs for the banks. Conversely, banks that meet or exceed the minimum ROA often reflect effective operations, have a reasonable asset structure, and exhibit flexibility in reallocating resources among asset categories in response to economic fluctuations. Moreover, the issue of non-performing loans is also alarming. Data from the State Bank of Vietnam (SBV) shows that the non-performing loan ratio reached 1.9% at the end of 2021 (an increase of 0.21 percentage points compared to the end of 2020). The increase in non-performing loans in the banking system was predicted due to the outbreak of the Covid-19 pandemic, especially, the fourth wave with the Delta variant in 2021, which caused significant losses to production, business activities, livelihoods, and people's lives. This increase also led to capital depletion in commercial banks, forcing them to continue paying interest on operating capital, resulting in decreased profits.

Regarding the operational efficiency of commercial banks, the study shows that the top five banks with the highest efficiency are AGRB, OCB, NAB, VAB, and PGB. In addition, among them, four are joint-stock commercial banks, and one is a state-owned commercial bank. Particularly, the average efficiency level in 2021 reached 81.02%. This finding indicates that Vietnamese commercial banks, in order to produce the same output, utilize 81.02% of their inputs. It demonstrates their effective operations and rational utilization of input resources, reflecting the level of success of these banks. However, compared to previous studies, the 81.02% efficiency level is considered low. For example, Tran and Bhaiyat's research (2016) reported an average technical efficiency of 87% for the period 2011-2014, Nguyen Thi Thu Thuong (2017) obtained an average technical efficiency of 94% for the period 2011-2015, and Le Phan Thi Dieu Thao and Nguyen Thi Ngoc Quynh (2013) for the period 2008-2012 reported an average technical efficiency of 92.84%, average pure technical efficiency (PTE) of 96.2% and average scale efficiency (SE) of 96.56%. In other words, it can be said that banks still waste approximately 18.98% of their inputs. Therefore, many banks are still not operating well and need to pay attention to the allocation of input resources to optimize output and achieve their defined goals. The more significant the difference between these two factors, the higher the efficiency. Moreover, the issue of non-performing loans has not been thoroughly resolved, and ROA is partly affected by non-performing loans and other factors, which is why some banks have a very low ratio.

**6. APPENDIX****Appendix 1. List of Vietnamese commercial banks in the study**

No.	Abbreviated name	Bank name	English name
1	ABB	NHTMCP An Bình	An Binh Commercial Joint Stock
2	BAB	NHTMCP Bắc Á	Bac A Commercial Joint Stock Bank
3	CTG	NHTMCP Công Thương Việt Nam	Vietnam Bank for Agriculture and Rural Development
4	BID	NHTMCP Đầu tư và phát triển Việt Nam	Joint Stock Commercial Bank for Investment and Development of Vietnam
5	ACB	NHTMCP Á Châu	Asia Commercial Joint Stock Bank
6	EIB	NHTMCP Xuất Nhập khẩu Việt Nam	Vietnam Commercial Joint Stock Export Import Bank
7	AGRB	Ngân hàng nông nghiệp và phát triển nông thôn	Vietnam Bank for Agriculture and Rural Development
8	BVB	NHTMCP Bản Việt	Viet Capital Commercial Joint Stock Bank
9	KLB	NHTMCP Kiên Long	Kien Long Commercial Joint Stock Bank
10	LPB	NHTMCP Liên Việt Post	Lien Viet Post Joint Stock Commercial Bank
11	MSB	NHTMCP Hàng hải Việt Nam	Vietnam Maritime Commercial Joint Stock Bank
12	NVB	NHTMCP Quốc Dân	National Citizen Commercial Joint Stock Bank
13	OCB	NHTMCP Phương Đông	Orient Commercial Joint Stock Bank
14	NAB	NHTMCP Nam Á	Nam A Commercial Joint Stock Bank
15	SCB	NHTMCP Sài Gòn	Saigon Commercial Joint Stock Bank
16	SHB	NHTMCP Sài Gòn - Hà Nội	Saigon Hanoi Commercial Joint Stock Bank
17	TPB	NHTMCP Tiên Phong	Tien Phong Commercial Joint Stock Bank
18	SSB	NHTMCP Đông Nam Á	Southeast Asia Commercial Joint Stock Bank
19	STB	NHTMCP Sài Gòn Thương Tín	Sai Gon Thuong Tin Commercial Joint Stock Bank
20	VBB	NHTMCP Việt Nam Thương Tín	Vietnam Thuong Tin Commercial Joint Stock Bank
21	VCB	NHTMCP Ngoại Thương Việt Nam	Joint Stock Commercial Bank for Foreign Trade of Vietnam
22	VIB	NHTMCP Quốc Tế	Vietnam International Commercial Joint Stock Bank
23	VPB	NHTMCP Việt Nam Thịnh Vượng	Vietnam Prosperity Joint Stock Commercial Bank
24	HDB	NHTMCP Phát triển TP.HCM	Ho Chi Minh City Development Joint Stock Commercial Bank
25	MBB	NHTMCP Quân đội	Military Commercial Joint Stock Bank
26	TCB	NHTMCP Kỹ thương Việt Nam	Vietnam Technological and Commercial Joint Stock Bank
27	SGB	NHTMCP Sài Gòn Công Thương	Saigon Bank For Industry And Trad
28	Baovietbank	NHTMCP Bảo Việt	Bao Viet Joint Stock Commercial Bank
29	VAB	NHTMCP Việt Á	Vietnam - Asia Commercial Joint Stock Bank
30	PGB	NHTMCP Xăng dầu Petrolimex	Petrolimex Group Commercial Joint Stock Bank

(Source: Author's summary)

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## A STUDY ABOUT THE EFFECT OF INTEREST RATE AND ASSET STRUCTURE ON STOCK PRICE RETURN OF COMMERCIAL BANKS IN VIETNAM

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**ABSTRACT:** *The purpose of this research was to determine the impact of interest rates and asset structure on the stock price return of commercial joint stock banks in Vietnam. The research data contains official World Bank statistics as well as aggregated data from the financial reports of 18 listed joint stock banks on the HOSE and HNX stock markets in Vietnam from 2013 to 2022. The research employed a quantitative approach, examining a regression model with panel data and a fixed effects model (FEM). The study gave valuable insights into the correlations between variables, revealing that interest rates as well as asset structure, including the proportions of cash, interbank deposits, loans, and investment to total assets, have a substantial impact on the stock price return of Vietnamese joint stock banks. As a result, recommendations for regulators, managers, and investors were made to achieve the best efficiency in management and investing.*

### 1. INTRODUCTION

Banks have consistently held an influential position in the national economy throughout history. One of the national economy's locomotives is the banking industry. As a result, bank stocks normally receive a lot of attention from stock market investors. Bank stock prices, on the other hand, tend to be more volatile due to their strong relationship to macroeconomic conditions (Gertler and Karadi, 2000). Many studies have demonstrated that interest rates are one of the macroeconomic elements that have a substantial impact on not only a bank's operations but also its stock value (DeYoung and Roland, 2001). And, in a specialised industry like banking, numerous factors must be addressed before making investment decisions, one of which is asset structure (Berger and Bouwman, 2009). Asset structure not only has a direct impact on profitability, but it also influences the bank's risk exposure (Fang and Wu, 2019). Many analysts have recently pointed out that the SVB bank incident was driven by pressure from the Fed's interest rate hikes and inefficient asset structure management. The question is what effect interest rates and asset structure have on the bank's operations, how investors interpret that relationship, and how stock prices tend to vary as a result. This is also the study's premise and inspiration. The goal of this study is to close the gap by evaluating and explaining the direct relationship between interest rates, asset structure, and the return on bank stocks from an economic and practical standpoint. Managers and investors will be able to draw more informed conclusions in the future.

Next, a literature review will be conducted to develop theoretical frameworks and hypotheses. From here, the research design phase commences. This analysis employs a quantitative approach with secondary data sources. After analysing and evaluating the data using various techniques to eradicate outliers, a regression model is created. This model is then examined for various flaws and modified so that the final model can best explain the stock price return's dependence on relevant factors. As presented in the preceding stages, recommendations are made to the relevant parties, and conclusions are derived.

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## **2. LITERATURE REVIEW**

### **2.1. Overview of banking sector and stock market**

#### **2.1.1. Overview of banking sector in Vietnam**

Banking is a financial institution that has been in existence for a considerable period of time, dating back to the inception of commerce and economics. The contemporary banking system, as it is currently recognised, originated in Italy during the early Renaissance period. This development occurred specifically in affluent northern cities such as Florence, Lucca, Venice, and Genoa, as noted by Reinhart and Rogoff (2013).

The banking history of Vietnam is intricate and extensive, dating back to the colonial era when French banks established their presence in the region. It was not until the 20th century that a proper banking system emerged in Vietnam.

Nguyen and Tran (2019) assert that the inception of Vietnam's modern banking system can be traced back to the early 1900s, during the period of French colonial rule. After gaining independence in 1945, Vietnam's banking system was nationalised and the State Bank of Vietnam (SBV) was established in 1951. The State Bank of Vietnam (SBV) was responsible for overseeing and supervising all financial institutions operating within the nation's borders. During the socialist era spanning from the 1950s to the 1980s, the banking system underwent a reform whereby all banks were nationalised and came under state ownership. In the aftermath of economic reforms in the late 1980s, Vietnam initiated a process of economic liberalisation and welcomed foreign investment into its economy. The contemporary financial system in Vietnam is constituted by a combination of banks that are state-owned, jointly owned, and owned by foreign entities. The SBV, which serves as the regulatory body for the banking industry, has implemented several measures aimed at enhancing the efficiency and stability of the sector through modernization efforts. The present investigation will centre on commercial banks, given that they are the sole category of financial institution that possesses listed units on the stock exchange of Vietnam. Banks hold a central position within a nation's financial and economic framework, thereby rendering their influence on the stock market quite consequential.

#### **2.1.2. Overview of stock market**

##### *2.1.2.1. Concept of stock market*

The stock market comprises various individuals and entities that engage in the buying and selling of stocks, which symbolise their ownership interest in a particular company. The classification of stock markets is predicated upon three discrete variables, namely liquidity, transparency, and regulation, which result in the distinction of three distinct categories of stock markets.

According to Bodie, Kane, and Marcus (2019), the secondary stock market is commonly denoted as the "stock market" due to its high level of stock trading activity and the application of the law of supply and demand in determining stock prices. Several scholarly investigations carried out by credible sources have demonstrated that the consistent operation of the stock market plays a pivotal role in promoting economic development. The aforementioned phenomenon can be attributed mainly to its capacity to enable corporations to obtain capital and foster the effective distribution of resources in the economy. The present study, in line with Beck, Demirgüç-Kunt, and Levine's (2000) findings, illustrates that the stock market exerts three effects that foster the promotion of economic growth in a wider context: affording investment prospects, enabling enterprises to obtain capital, and enhancing corporate governance.

##### *2.1.2.2. The relationship between commercial bank and stock market*

The established link between the stock market and commercial banks is widely recognised. Levine and Zervos (1996) posit that commercial banks have the potential to make a substantial contribution to the expansion of stock markets through the provision of diverse services to investors. These services encompass



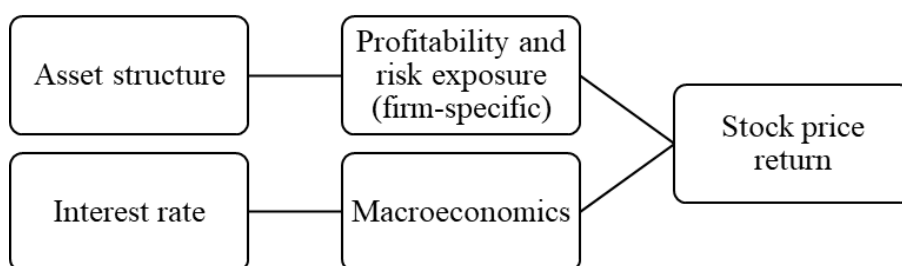
the facilitation of trading, the provision of finance, and the underwriting of securities. In general, there exists a symbiotic relationship between commercial banks and the stock market, wherein commercial banks assume a pivotal function in enabling the expansion and efficient functioning of stock markets.

## 2.2. Factors affecting stock price of banks.

### 2.2.1. Overview of factors affecting stock price of banks

Several scholarly investigations have been conducted to examine the variables that impact stock prices across various markets (Srinivasan & Sivakumar, 2013; Kurtdede et al., 2016; Vasilios Sogiakas et al., 2014; Muhammad Haseeb et al., 2016). In summary, the overarching inference can be specified as follows: the stock price is influenced by two primary categories of factors, namely macroeconomic factors and microeconomic or firm-specific factors. Studies have suggested that interest rates are among the most influential macroeconomic factors affecting stock price returns for commercial banks. The impact of interest rates on commercial banks is a multifaceted and intricate phenomenon that is contingent upon several factors, including the bank's risk profile, business model, and market conditions. The impact of interest rates on banks can manifest in various dimensions, including net interest margin, loan demand, credit risk, and investment portfolio, as posited by Demirgüç-Kunt and Huizinga (1999). Firm-specific factors pertain to the endogenous factors that impact the operational outcomes of a given firm. The assessment of commercial banks encompasses various aspects such as the institution's managerial practises, financial framework, asset calibre, and operational efficacy (Altunbas, Carbo-Valverde and Molyneux, 2011). Among these factors, asset structure holds significant importance. Berger and Bouwman (2009) posit that the asset composition of a financial institution plays a crucial role in determining the nature of its assets and the manner in which they are financed. In the banking industry, it is common for financial institutions to maintain a diversified portfolio of assets, including loans, securities, and cash. These assets are typically financed through a combination of deposits, borrowings, and other funding sources. The configuration of assets and funding sources can exert a significant influence on a bank's profitability and risk profile. This is due to the fact that assets and funding sources possess distinct levels of risk and return. Demirgüç-Kunt and Huizinga (2010) posit that the stock price performance of commercial banks is significantly influenced by their level of risk exposure.

In general, the performance of any given stock is influenced by two primary factors: macroeconomic conditions and the inherent attributes of the company. The present study aims to examine the impact of two distinct factors, namely interest rate as a macroeconomic factor and asset structure as a firm-specific factor, on the stock price return of banks operating in Vietnam.



**Figure 1.** The relationship between asset structure, interest rate and stock price return of commercial banks (Author, 2023)

### 2.2.2. The effect of interest rate on banks

Drawing upon the theoretical framework of marginal utility, initially proposed by John Rae in 1984 and subsequently developed by Eugen von Böhm-Bawerk in 1889 and Irving Fisher in 1930, it can be inferred that

the interest rate plays a pivotal role in shaping financial behaviour, particularly with regard to the allocation of funds. With low interest rates, people and entities tend to borrow and invest more. On the other hand, a high interest rate encourages cash flows to go into saving. These theoretical views about marginal utility are the foundation for future studies about the effect of interest rates on financial activities in general and banking operations in particular. According to Mishkin (2016), investment decisions are influenced by interest rates, which in turn have a significant impact on two key factors that are closely associated with banks, namely, profits generated from lending activities and the valuation of financial assets held by banks. Financial institutions generate income by engaging in lending operations, wherein they levy interest charges on loans that exceed the interest rates offered on deposits. Hence, the determination of banks' profitability is significantly influenced by the interest rates applicable to loans. DeYoung and Roland's (2001) research indicates that changes in lending rates have notable impacts on the profitability of banks. An increase in interest rates can potentially result in a decrease in net interest margin for banks. This is due to the fact that when interest rates rise, banks are required to pay higher rates on customer deposits and other funding sources. However, the interest rates on existing loans and assets may remain fixed for a certain period of time, as noted by Agoraki, Delis, and Pasiouras (2019). The negative impact of this phenomenon on bank profitability and stock returns has been documented in previous studies (Fung, Lin, and Mitchell, 2015; Akhigbe and McNulty, 2013).

Financial assets held by banks are also affected by interest rates. The discount rate, used for assessing diverse asset categories, exhibits a strong correlation with interest rates. Several studies have been carried out to investigate the relationship between interest rates and discount rates. The interpretation and theoretical frameworks applied to the relationship between the two can result in differing causal conclusions. Nonetheless, a prevalent observation that can be inferred from such studies is that there exists a strong link between interest rates and the discount rate (Thornton, 1982; Lucas, 1978; CFA Institute). Market interest rate fluctuations have an inevitable impact on the required rate of return for investment and the valuation of diverse assets. This, in turn, affects the returns of investors, including banks. In general, interest rates have an impact on many aspects of commercial banks, not only on operations but also on investing and financing. Consequently, it is possible to make predictions regarding the influence of interest rates on the stock value of the banking sector. The trajectory of the impact is contingent upon a multitude of intricate factors that are intricately linked to particular macroeconomic circumstances. Based on the previously mentioned research, it is possible to formulate a hypothesis that suggests a negative correlation between interest rates and the stock price return of banks. This correlation is believed to be due to the impact of high interest rates on reducing profitability and intrinsic value in valuation methods.

### **2.2.2. The effect of asset structure on banks**

The asset structure of commercial banks refers to the relative distribution of asset categories across the bank's financial statement in relation to the overall total asset. According to Pham's (2011) publication in the *Journal of Southeast Asian Economies*, the primary constituents of asset structure in Vietnam's commercial banks consist of the proportion of loans, investments, and cash and cash equivalents, which encompasses cash, reserves held at the central bank, and interbank deposits.

In Vietnam, loans comprise the predominant component of bank assets. Financial assets are created by banks to lend to borrowers, with the expectation that they will be repaid with interest within a specified timeframe. This constitutes the primary revenue source for banks, and they all aspire to stimulate its growth as it directly contributes to revenue expansion. According to Berger and Bouwman (2017), loans are comparatively more lucrative than other forms of assets. Banks that have a greater percentage of loans in their asset portfolio may possess superior capability to generate revenue and sustain profitability in the long run.

Investments are a means by which financial institutions allocate their capital to a variety of asset classes, including but not limited to equities, fixed-income securities, and other similar instruments. These financial instruments are used for either short-term trading or long-term investment purposes. There are two primary categories of assets: stocks and bonds. Distinct asset categories possess varying attributes, and their influence on profitability exhibits dissimilarities as well. In actuality, the predominant investment type held by commercial banks in Vietnam is bonds. Bonds are associated with distinct risks, including credit risk and interest rate risk. Credit risk pertains to the possibility of bond issuers defaulting and being unable to fulfil their obligation to pay the coupon and principal. On the other hand, interest rate risk refers to the likelihood of bonds losing their value in the event of a rise in interest rates in the market. The possession of bonds in a burgeoning economy such as Vietnam may be regarded as a prospective risk.

Banks maintain cash and cash equivalents in the form of highly liquid assets, including cash and treasury bills, to fulfil depositor withdrawal demands and facilitate new lending activities. (Rose, 2005). The aforementioned comprises three distinct categories: cash, central bank reserves, and interbank deposits.

The importance of cash as an asset for maintaining a bank's short-term liquidity cannot be overstated, as it serves as a means to satisfy payment obligations and accommodate customer withdrawals. According to Ozkan and Ozkan's (2015) argument, the effective management of liquidity risk requires the maintenance of an optimal cash ratio. As per the findings of Longstaff and Rajan (2018), cash serves as a crucial buffer for financial institutions, enabling them to address unforeseen requests for withdrawals and offset deficits during phases of economic turbulence.

Central bank reserves refer to mandatory deposits that banks must maintain with the central bank as a precautionary measure against potential risks, to meet currency requests from other banks, or to complete interbank transactions. Frost and de Haan (2016) posit that the lending practises and profitability of banks may be impacted by the interest rate on the reserves established by the central bank. The relationship between the reserve levels that banks maintain at central banks and their financial gains is complex and dependent on various factors.

Interbank deposits are indicative of the level of interbank market participation. Interbank loans and deposits play a crucial role in liquidity management, risk mitigation, payment assurance, and monetary policy transmission. However, the impact of interbank deposits can be either favourable or unfavourable. According to Tavakoli and Mohammadi (2019) and Cihak and Hesse (2010), interbank deposits have the potential to pose considerable risks for banks, specifically counterparty risk and systemic risk.

Generally, academic research supports the hypothesis that a bank's asset structure, specifically the proportion of liquid assets to total assets, can significantly impact its stock price. Nguyen, Nguyen, and Nguyen (2018) conducted a significant study in Vietnam. The study analysed Vietnamese banks listed on the Ho Chi Minh Stock Exchange between 2010 and 2017. Banks with greater liquid assets, such as cash and cash equivalents, had higher stock values. Banks with higher levels of liquid assets are believed to manage liquidity risk better and respond better to market changes. Banks with adequate liquid assets are perceived as better equipped to handle liquidity risk and adapt to market changes, potentially resulting in a higher stock value. Identifying the optimal asset structure is a challenge for bank managers due to the constantly changing economy.

### **2.3. Summary**

The unique role played by a bank gives rise to its distinctive operational characteristics when compared to other entities operating within the economy. The determination of a bank's stock value is

contingent upon not only fundamental macroeconomic factors such as inflation and interest rates, but also a unique factor that distinguishes it from other industries, specifically, the composition of its assets. The interest rate exerts a significant influence on the financial decisions made by both individuals and firms, thereby affecting the operations of commercial institutions. Investors assess the risk management capabilities of banks by analysing their asset structure as presented in their financial reports. This evaluation informs their expectations of the bank’s future activities and earnings. The phenomenon exerts a significant influence on the operations within the stock market and the assessment of stock values.

### 3. RESEARCH METHODOLOGY

#### 3.1. Research approach

The study uses a quantitative research method, with data presented in table form, including cross-sectional and time-series observations. According to Wooldridge (1997) and Khanh (2011), the common regression models with panel data are the pooled regression model, fixed effects model (FEM), and random effects model (REM). Using the pooled regression model with the ordinary least squares method is not appropriate because the estimation results are biased, often resulting in the problem of autocorrelation or the constraint of residuals, leading to a low Durbin-Watson statistic (Baltagi, 2005; Park, 2009). To choose between FEM and REM, Wooldridge (1997) used the Hausman test. This is a test developed by Hausman (1978) with a chi-square asymptotic distribution and used to test the hypothesis that the regression results of FEM and REM are not significantly different. If this hypothesis is rejected, then the conclusion is that REM is not appropriate, and in this case, FEM will be selected. The study uses the Hausman test to select the appropriate regression model. The selected model is then tested for common defects such as autocorrelation and heteroskedasticity and adjusted using robust standard deviations if necessary.

#### 3.2. Research hypothesis

Based on literature review, the research hypotheses are as following:

**Table 1. Research hypotheses and related studies**

Hypotheses	Previous studies
H1: There is a significant relationship between Interest Rate and Stock Price Return of commercial banks.	Fung, Lin, and Mitchell (2015), Drehmann and Juselius (2014), Thornton (1982)
H2: There is a significant relationship between the Proportion of Cash in Total Asset and Stock Price Return of commercial banks.	Longstaff and Rajan (2018)
H3: There is a significant relationship between the Proportion of Reserves at the State Bank in Total Asset and Stock Price Return of commercial banks.	Levine (2017)
H4: There is a significant relationship between the Proportion of Interbank Deposits in Total Asset and Stock Price Return of commercial banks.	Tavakoli and Mohammadi, (2019)
H5: There is a significant relationship between the Proportion of Loans in Total Asset and Stock Price Return of commercial banks.	Berger and Bouwman (2017)
H6: There is a significant relationship between the Proportion of Investments in Total Asset and Stock Price Return of commercial banks.	Bordo and Murshid (2016)

### RESEARCH MODEL

Based on research hypotheses, the proposed model is as following

$$APR = \beta_0 + \beta_1 IR + \beta_2 PC + \beta_3 PR + \beta_4 PD + \beta_5 PL + \beta_6 PI + \epsilon$$

In which variables are calculated in the following table:

**Table 2. Description of variables**

No	Variable	Acronym	Variable Definition
Dependent variable			
1	Stock price return	APR	
Independent variables			
1	Interest rate	IR	Collected from World Bank Data
2	Proportion of Cash	PC	
3	Proportion of Reserves in Central bank	PR	
4	Proportion of Interbank Deposits	PD	
5	Proportion of Loans	PL	
6	Proportion of Investments	PI	

### 3.3. Data

The data for this research is secondary data. The data will be collected directly from reputable sources. In terms of scope, the data will be filtered from 18 companies listed on the HNX and HOSE, as only the joint stock commercial banks on these two exchanges have stock prices determined by the laws of supply and demand and rationally reflect investor expectations. The time frame will be 10 years, from 2013 to 2022.

The following table shows the mean, standard deviations, minimum and maximum values of each variable in the dataset.

**Table 3. Descriptive analysis**

Variable	Mean	Std. Dev.	Min	Max
APR	0.094129	0.4273742	-0.5983087	2.19
IR	8.03871	1.003628	7	10.4
PC	0.9760139	0.3694267	0.3445246	1.830154
PR	2.948619	1.73739	0.6144737	10.31805
PD	10.81636	5.83569	0.7481409	25.31681
PL	62.8189	8.339069	36.31595	78.80603
PI	14.3087	4.871204	4.958703	26.52031

## 4. FINDINGS AND DISCUSSION

### 4.1. Correlation analysis

The study conducts correlation analysis by creating a correlation matrix of variables, which is presented in Table 4.

**Table 4. Correlation matrix**

	APR	IR	PC	PR	PD	PL	PI
APR	1.0000						
IR	-0.3408	1.0000					
PC	0.6040	-0.2817	1.0000				
PR	0.1380	-0.0359	0.1010	1.0000			
PD	-0.0358	0.2145	-0.1806	-0.1424	1.0000		
PL	0.4508	-0.2253	0.4219	0.0897	-0.1972	1.0000	
PI	-0.5665	0.1931	-0.4254	-0.0786	-0.1167	-0.3533	1.0000

Based on Table 4, at a significance level of 5%, the correlation coefficients between each pair of variables are all less than 0.7. This indicates that the likelihood of multicollinearity in the research model is low.

**4.2. Regression analysis**

The author conducted a Breusch-Pagan Lagrangian Multiplier test to choose between the OLS and REM regression models. After that, the Hausman test was used to select the appropriate regression model between FEM and REM. The results of these two tests are shown in the following table:

**Table 5. Results of tests for choosing model**

Test	Comparison	Chi-squared statistic	Prob.	Conclusion
Breusch-Pagan Lagrangian Multiplier	OLS vs REM	20.92	0.0000	REM
Hausman	REM vs FEM	1941.70	0.0000	FEM

According to Table 4, the Prob > Chi-squared statistics are less than 0.05 for both tests, indicating that the Fixed-Effect Model (FEM) is the most appropriate model for the dataset.

After identifying the most appropriate model, a test for time-fixed effects was conducted because it is reasonable to believe that macroeconomic conditions may vary from year to year and affect the return of bank stocks. Controlling for variables that are constant across entities but vary over time may be necessary because it eliminates the omitted variable bias caused by excluding unobserved variables that evolve over time but are constant across entities. The results show that time-fixed effects are necessary, but it also shows that in all variables, the variable PR is not statistically significant.

To check if the model suffers from common defects of linear regression, the Wooldridge test for autocorrelation and the modified Wald test for heteroskedasticity were conducted. The results show that time-fixed effects are necessary. Although the model does not suffer from autocorrelation, it suffers from heteroskedasticity. Therefore, robust standard deviation is used to address this issue. The final model result after being adjusted is as follows:

**Table 6. Final result of FEM**

Fixed-effect Model				
R-squared	Within	=0.8440	F(13, 17)	=255.87
	Between	=0.0772	Prob > F	=0.0000
	overall	=0.5402	Corr (u <sub>i</sub> , Xb)	=-0.5793
	Coefficient		t with Robust Std. deviation	P >
IR	-.1703346***		-3.09	0.007
PC	.5753158***		2.93	0.009
PD	-.0159352*		-2.10	0.051
PL	.01427**		2.13	0.048
PI	-.0470785**		-2.15	0.046
Dummy year variables	Yes			
Rho	.78840138			
F test that all u <sub>i</sub> = 0: F(17, 92) = 7.60			Prob > F = 0.0000	

Note: \*\*\*, \*\* and \* represent the statistic is significant at 1%, 5% or 10%.

The final result shows that all variables are statistically significant, except for the variable PD, which is significant at the 10% level with  $\text{Prob} > |t| = 0.051$ . The overall R-squared is 54.02%. Overall, 54.02% of the variance in stock return can be explained by factors such as interest rates, cash ratios, interbank deposits, loan ratios, and securities investment ratios. The model shows a moderate relationship between the dependent and independent variables.

The final regression equation is formed as following:

$$\text{Return} = \beta_0 - 0.170 \times \text{IR} + 0.575 \times \text{PC} - 0.016 \times \text{PD} + 0.014 \times \text{PL} - 0.047 \times \text{PI} + \alpha_i + \varepsilon_{it}$$

Where:

$\beta_0$ : the unknown intercept for each entity.

$\alpha_i$ : entity-specific fixed effect

$\varepsilon_{it}$ : overall error term

#### 4.3. Discussion of findings

The model's within-model R-squared is high at 84.4%. 84.4% of the variance in stock returns can be explained by the independent variables within each bank group. The model fits well for each bank, and there is a strong relationship between the dependent and independent variables. The model is applicable within each bank's time frame.

The between-model R-squared is low at 7.72%. The explanatory power of the differences between group means is very weak. Thus, the model may not be appropriate for comparing banks.

The study analysed secondary data from 18 joint-stock commercial banks in Vietnam from 2013 to 2022 using the fixed-effect model (REM). The results showed that a model with five factors had a significant explanatory rate of 54.02% on the dependent variable, stock price return. The research findings are as follows:

Lending interest rates in Vietnam from 2013 to 2022 have negatively impacted the return of commercial bank stocks. Interest rates have a dual effect on bank stocks, affecting profitability and pricing methods, as noted in the literature review. The finding can be attributed to the close relationship between lending interest rates and discount rates (Thornton, 1982; Lucas, 1978; CFA Institute). Most bank assets are financial assets. A high discount rate reduces the value of financial assets and stocks using pricing methodologies like the dividend discount model and the Gordon growth model. Lending interest rates are linked to the State Bank of Vietnam's policy rate for economic management. Vietnam's State Bank has implemented a restrictive monetary policy by increasing policy rates to control inflation. This has led to higher interest rates and a less optimistic investment climate, straining the bank's operations. In the latter half of 2022, due to the FED's interest rate increase, the State Bank of Vietnam raised the policy rate, resulting in downward stock market adjustments.

The cash-to-total assets proportion affects the commercial bank stock's return. Banks use cash to maintain liquidity and fulfil customer withdrawal requests. Ozkan & Ozkan (2015) emphasise the importance of maintaining adequate cash reserves for banks to ensure short-term liquidity. Cash holdings in Vietnamese joint-stock commercial banks range from 0.34% to 1.83% of total assets. A higher cash ratio within this range implies better liquidity, indicating the bank's risk management and internal capacity are relatively strong. Cash is a low-risk asset because it is not exposed to credit and market risks like loans or securities. A bank can enhance its financial stability and lower its risk profile by increasing its cash holdings. This indicator benefits investors and increases the value of banking stocks.

The reserve proportion at the State Bank of Vietnam does not affect the banking sector's stock return. A reserve helps banks operate stably, manage risk, handle unexpected losses and liquidity shocks, and fulfill obligations. This reserve decreases credit for lending and investment, causing opportunity costs. Reserves can have offsetting effects, making their overall impact complex. McLeay et al. (2014) argue that bank lending is not influenced by their reserves, and reserves do not significantly contribute to money creation. The authors propose that banks can create money by extending credit and that reserve availability does not limit their lending ability. Therefore, there is reason to believe that reserve levels do not necessarily impact bank operations. The impact of the reserve ratio at the State Bank of Vietnam on the value of stocks in Vietnamese banks is unclear due to offsetting positive and negative effects.

The proportion of interbank deposits to total assets negatively affects the banking sector's stock return. Interbank deposits have both positive and negative effects, as stated in the research review. This conclusion has two possible interpretations for Vietnamese joint-stock commercial banks. Firstly, it suggests a decrease in lending activity, leading to excess reserves and lower opportunity costs. It impacts the bank's risk management capacity. During liquidity crises or economic downturns, banks face challenges due to the counterparty risk involved in depositing funds at other financial institutions (Tavakoli & Mohammadi, 2019). Interbank deposits can create contagion risks if one bank defaults, which can quickly spread to other banks that have deposited with it. Default chain reactions can trigger systemic crises. Vietnamese joint-stock commercial banks often face significant liquidity problems. VietinBank, Agribank, DongA Bank, and SCB are among the banks that have undergone restructuring in recent years. A high interbank deposit ratio is concerning for the developing Vietnamese banking system due to high counterparty risk and inefficient lending with surplus reserves. These factors impact the bank's value and investors' assessment of its shares.

The loan-to-asset proportion positively affects the profitability of banking stocks. Lending is the primary revenue-generating activity for banks, and therefore, this outcome can be anticipated. A high proportion suggests strong lending activities for the bank, with potential for significant revenue and no opportunity costs from excess funds. Banks with higher loan levels can generate increased profits due to various factors. Banks earn interest income from loans. If a bank has a higher proportion of loans in its assets, it can generate more interest income. Banks can earn fees and commissions on loans in addition to interest income. Loans aid banks in diversifying their portfolios and mitigating risk. Banks can reduce their risk and exposure to any one borrower or sector by lending to a variety of borrowers in different sectors and industries. This can enhance banks' long-term profitability and stability. Higher loan levels in banks lead to increased profitability and intrinsic value, resulting in higher stock price returns. Vietnam's growing economy and increased investment prospects offer significant potential for expanding lending activities. Loan demand in Vietnam is increasing, especially in real estate, industry, trade, and services. Banks can increase profits by expanding lending activities, but they also face the challenge of increasing the value of their stocks.

The banking sector's stock return on equity is negatively impacted by the proportion of investments to total assets. The observed outcome can be explained by the predominant allocation of investments towards bonds in Vietnam, despite the theoretical inclusion of stocks. Vietnam's credit rating is low. Vietnam's sovereign credit rating as of September 2021 is B1 by Moody's, BB- by Fitch Ratings, and BB by Standard & Poor's. The mentioned ratings are classified as non-investment grade or "junk bond." Vietnamese corporations have not been assessed using global standards, leading to higher credit risk in the country. Several bond defaults and scandals have occurred, such as OceanBank's in 2015, VinaConex's in 2020, and multiple real estate companies' in 2022. Holding many bonds increases a financial institution's credit risk. Financial institutions often set aside provisions for bonds, affecting bank profitability. Greater



holdings require increased provisional allocation, especially due to the lack of transparency in Vietnam's bond market. These unfavourable indicators negatively affect the stock's appeal and value for shareholders.

## **5. RECOMMENDATIONS**

### **5.1. Recommendations for regulators**

The findings confirm that interest rates are crucial in determining banking activities and stock valuation. Interest rates are closely tied to the policy rate set by the State Bank of Vietnam. The State Bank of Vietnam must consider the impact of its policy adjustments on the banking-dominated stock market, in addition to its primary objectives of regulating inflation, managing monetary supply, and controlling exchange rates. Bekaert and Harvey (2003) suggest that a robust stock market can stimulate economic growth by promoting investment and spending. A strong stock market can offer businesses greater access to capital. The State Bank of Vietnam must be cautious and diligent when considering changes to interest rates. The State Bank of Vietnam has lowered the policy rate to help banks find borrowers, increase financial asset value, attract more capital to the stock market, and assist enterprises in raising funds.

The State Bank of Vietnam has set rules for reserve ratios based on time deposit categories and bank-held reserves. This model shows that the impact of the reserve-to-stock price return ratio is uncertain due to the opposing effects of positive and negative factors. Maintaining current minimum reserve ratio regulations is justifiable in the future. Changing these rules may have unpredictable consequences for the bank's operations.

The central bank must prioritise strategies that improve financial system transparency. This can reduce the risks associated with bonds and interbank transactions and increase investor confidence in the banking sector and the stock market.

### **5.2. Recommendations for bank managers**

Research shows a link between asset structure and stock price return, affecting profitability and risk exposure. Maintaining a stable stock value is crucial for discovering new investment opportunities and increasing the likelihood of successful fundraising. Bank managers must carefully analyse and improve asset structures tailored to each bank's unique characteristics based on macroeconomic conditions and long-term goals.

Different types of assets have different levels of impact. Banks primarily provide capital for investment, consumption, and production through lending. Banks must maintain a significant allocation of assets at all times, as loans are their primary source of income. Maintaining and growing this asset category is vital for the financial institution's stability, profitability, and growth.

In addition to revenue growth, banks must effectively manage risks. The allocation of cash, bond holdings, and other assets can indicate a bank's level of risk exposure. Banks must manage risks by identifying, measuring, monitoring, and controlling them to maintain acceptable levels.

Credit risk is a primary concern for banks when dealing with loans or bonds, as it involves the potential for borrowers to default. Banks use credit scoring, loan covenants, collateral, and loan loss provisions to manage credit risk. Vietnam's Credit Information Centre has comprehensive credit information, but international credit scoring systems have not been implemented. Credit risk remains a significant concern for Vietnam's banking industry.

Banks face market risk due to changes in interest rates, foreign exchange rates, and other market variables. This risk impacts stock prices. Banks need to employ hedging, diversification, and stress testing

to manage market risk. The risk management system in Vietnamese banks falls short of expectations, resulting in volatile stock groups with high returns but significant risks. To enhance bank stock value and attract investment, managers should prioritise research and risk management.

### **5.3. Recommendations for investors**

Investors should closely monitor the macroeconomic environment, including interest rate fluctuations, to make informed investment decisions due to the interdependence between the banking sector and the economy.

Investors must consider the balance sheet's asset structure in addition to monitoring financial performance. This enhances our understanding of financial performance and stock price fluctuations. Analysing a bank's asset composition is vital for making investment decisions in bank stocks. The asset composition of a financial institution can provide insights into its risk exposure, financial performance, and expansion potential. Banks with a high percentage of low-risk assets, like government securities, may have lower profits but are less likely to default. Financial institutions with a higher percentage of high-risk assets, like loans, may be more profitable but also more likely to default. Analysing a bank's assets can help stakeholders understand its solvency. Financial institutions with higher liquid asset ratios are better equipped to withstand market disruptions and maintain operations during times of financial stress.

Investors must understand different bank assets and their effects before making investment strategies in this sector.

### **5.4. Limitations**

The R-square values suggest that this model is better suited for tracking changes within a bank over time than comparing different banks. When making investment decisions based on interest rates and asset structure, the focus should be on whether the bank's stock is a better investment compared to the previous year, rather than comparing it to another bank's stock.

This study does not evaluate the asset's quality. Asset quality is a crucial factor to consider when evaluating a bank's assets. Asset quality pertains to a bank's loan portfolio and the probability of loan repayment. Banks with strong assets are typically viewed as more financially stable and less risky than those with weaker assets.

Credit risk is a major concern for banks, as it occurs when borrowers are unable to repay their loans. Banks with high NPLs may suffer losses and reduced financial performance. Banks with low-quality assets may encounter regulatory measures, harm to their reputation, and reduced customer trust.

Banks with high-quality assets are more resilient to economic downturns and market disruptions due to their lower risk of default. Banks with good asset quality can provide better interest rates to borrowers, which can lead to more lending and profits.

Asset quality is crucial for a bank's financial stability. Asset quality is closely monitored by investors and regulators to evaluate a bank's financial performance and risk profile. This model overlooks specific loan types, tenures, and other details that financial statements provide. Asset quality insights were not covered in this study.

## **6. CONCLUSION**

Interest rates and asset structure significantly affect the stock price returns of banks, according to the study. Interest rates directly affect bank profitability by impacting the cost of funds and income from loans and investments. The composition of assets, including cash, interbank deposits, loans, and investment

securities, affects the profitability and risk of bank stocks. Investors should evaluate risk and profitability factors to make informed decisions about investing in banks. Banks should monitor their asset structure and assess interest rate risk to improve long-term financial performance.

This study has established a basis for future research on the topic. Further research should address the limitations of this study to yield more practical and valuable insights for investors, regulators, and bank managers.

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## SUPPLY CHAIN DISRUPTIONS AND FIRM OUTCOMES: EVIDENCE FROM SOUTHEAST ASIAN COUNTRIES

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**ABSTRACT:** *This study investigates the impact of supply chain disruptions on the performance of Southeast Asian businesses. The analysis is based on a panel dataset covering 6 countries from 2018 to 2021. We use the fixed effects (FE) model to estimate our baseline results and the difference-in-difference (DiD) estimation to better clarify the impact of the pandemic on corporate performance. Our overall results suggest a negative impact of supply chain disruption on corporate performance. However, in several cases, it has a beneficial influence on the business performance of enterprises in the Industry group. Our findings also show that the strictness of government policies to deal with the Covid-19 pandemic negatively affects businesses' revenue. Given these results, we propose a series of recommendations to assist firms in adjusting to and dealing with the risks and challenges arising out of supply chain disruptions.*

**Keywords:** *Supply chain disruption, Corporate performance, DiD.*

### 1. INTRODUCTION

Global supply chain plays an essential role in the economic integration of nations, and is considered the “artery” of the global economy. According to Chopra & Meindl (2016), the global supply chain refers to the network of suppliers, manufacturers, distributors, and retailers engaging in producing and distributing goods and services among different nations and regions. Participating in the global supply chain gives enterprises access to the low-cost labor force and raw materials, as well as financial support, market expansion, and government incentives (such as tax reduction), which furthermore creates an entry barrier and keeps these businesses in their current market positions (Manuj & Mentzer 2008).

Because of the interdependence of nations regarding raw materials, components, and finished goods, the global economy is becoming increasingly intertwined. The figures demonstrate a general surge in each nation's reliance on foreign inputs throughout time. For instance, Li et al. (2019) report that global supply chain (GSC) operations made up around 12.9% of the global GDP in 2017, a significant increase from 9.6% in 1995.

Ever since the outbreak of Covid-19, over 210 nations and territories have reported more than 759 million cases of infection and 6.8 million fatalities (WHO, 2023). Under the government's disease prevention efforts, supply chain disruptions caused by border closures, travel restrictions and workplace closures or social distancing have posed a particularly serious risk to the global supply chain. In other words, the pandemic has exposed the susceptibility of global supply chains to external shocks.

The protracted Covid-19 outbreak has witnessed variations in the degree of closure, the epidemic situation, the number of infections, recoveries, and even countermeasures among nations. Many tactics have been implemented to prevent epidemics from spreading through nations, including travel restrictions and halting the manufacture of certain goods in favor of essential goods, which caused some industries to disappear completely.

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Additionally, many production industries were delayed, containers that could not be delivered were jammed due to the customs requirements to prevent epidemics, etc. The uneven distribution of goods among regions has put pressure on the market, disrupting supply and demand chains and causing severe losses in all aspects, from the economy, culture, and tourism, to human life globally (La et al., 2020; Nguyen An, 2020).

In this study, we attempt to examine how supply chain disruption affects business results in Southeast Asia, which involves 11 countries cooperating with each other on many fronts, and having more geographical similarities than other regions. Although there has been a wide range of research papers on the effect of supply chain events with diverse methods around the world, little research has focused on quantifying the effect of supply chain disruption on the performance of enterprises in Southeast Asian countries. Furthermore, the contexts of most conducted studies do not include the Covid-19 epidemic, thereby not concerning the severity of the shutdown measures from the government.

This study makes three major important contributions. First, our paper expands and complements theories that emphasize the role of supply chains in the circulation and production of goods. Although the theories of the preceding authors are plausible, a reliable assessment of supply chain disruption's impacts is yet largely unexplored. As a result, we provide micro-level evidence on the impact of global supply, as well as wire disruptions on business outcomes in Southeast Asian nations, which are considered to be the region adjacent to China, the source of Covid-19. Second, the study contributes to the research direction concerning with the economic impact of the Covid-19 pandemic. The authors derive from previous theories and provide one of the earliest pieces of evidence showing how supply chain disruptions during the pandemic in various countries affected corporate revenue growth. In addition, regarding practical contributions, we provide a series of recommendations to assist firms in adjusting to and dealing with the risks and challenges arising out of supply chain disruptions.

Apart from the Introduction, our paper is structured as follows: Section 2 reviews the theory which helps to explain the effects of supply chain disruptions on firm performance, as well as a literature review of previous research. Section 3 illustrates the data and methodology used for analysis. Section 4 presents specific results and a discussion of such findings. Lastly, we conclude the overall research findings and propose some recommendations for firms to better adjust in the context of supply chain disruptions.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Theoretical basis**

Contingency theory emphasizes the importance and impact of situational factors on the performance of firms (Lawrence & Lorsch, 1967). This idea states that both internal and external aspects of the corporate environment will affect how a business makes optimal decisions and takes action (Helms, 2000). More specifically, contingency theory precisely explains how influencing factors and performance results relate to enterprise behavior and operation, as well as how situational factors affect such a relationship. According to Lawrence & Lorsch (1967), this theory is based on four fundamental aspects:

- There exists no optimal method for firms to handle every situation they confront.
- The companies' operating procedures and organizational structure must be appropriate for their environment.
- To ensure effective functioning, businesses need to establish a harmonious relationship between internal and external factors.
- The performance of the business will be enhanced if enterprises build a management structure adequate for the duties and nature of each task as well as particular environmental characteristics.

Contingency theory considers firms as open systems where information is exchanged throughout the input-output process (Schoonhoven, 1981). “Inputs” include relevant internal and external issues, while “process” indicates the organization’s behaviors towards these inputs. “Outputs” refer to the outcomes of processes, which aim to find out the appropriate procedures for an organization in response to environmental characteristics. Usually, these outputs refer to performance measurements. Thus, contingency theory forms a natural theoretical framework for elucidating the conditions that can lead to the development of proactive supply chain risk management (Grötsch et al., 2013).

We decided to use contingency theory to explain the effects of supply chain disruptions on firm performance. More specifically, based on this theory, the impacts on business outcomes of supply chain disruptions depend on the specific circumstances surrounding such disruptions, such as the degree of dependence on foreign inputs, or the strictness of the closure policy during the epidemic control period.

## **2.2. Literature review**

Much of the prior research demonstrates how the epidemic affects businesses and industries in a particular country. Ozgur et al. (2023) conclude that supply chain disruptions are more severe in businesses located in developed nations like the United States and the United Kingdom and less severe in nations such as New Zealand and Australia. However, when studying the impact of supply chain disruptions on companies in Central Europe during the early stages of the Covid-19 pandemic, Veselovská (2020) claims that there was not much difference among enterprises of different countries regarding their response to such disruptions.

Another strand of literature focuses on the impacts of supply chain disruption on different industries. In the research on the impacts of the Tohoku catastrophe, Arto et al. (2015) conclude that the industries most affected by this disaster are transportation equipment, base metals, fabricated metals, wholesale trade, financial intermediation, and other businesses. When studying the impact of supply chain disruptions attributed to the pandemic on Vietnam’s textile and garment industry, Nguyen Thanh Son (2022) concluded that this industry is adversely affected when output and manufacturing processes are disrupted along the value chain. EY’s report (2023) shows that the disruption caused by Covid-19 has impacted most sectors of the economy; however, besides the industries that are negatively affected by the Covid-19 epidemic, there are also sectors that have not been significantly affected and may even have benefited from it. Research by Veselovská (2020) confirms that some businesses were successful in adjusting their supply chains to the new circumstances brought on by the outbreak, thereby increasing their revenue. Considering Covid-19 as a global supply chain shock, Ersahin et al (2022) find that businesses facing higher supply chain risks will establish relationships with domestic suppliers and become closer to industry-leading suppliers.

Other researchers concentrate on the impacts of supply chain disruptions on firms’ financial situation. Businesses of different sizes suffer from different extents of effects, which last not only for a short time but also continue for a long period after disruptions occur (Baghersad & Zobel, 2020). Previously, when studying the effect of supply chain disruptions arising from the Covid-19 epidemic on the financial situation of businesses across 21 countries, Choudhury et al (2022) concluded that such disruption reduced the shareholder value of the business by 2.16% on average. According to the results of in-depth interviews with Vietnamese enterprises conducted by Nguyen Thanh Hieu et al (2020), a lack of raw materials caused the majority of such businesses to operate slowly. To illustrate, enterprises in the manufacturing industry rely heavily on imported raw materials, therefore, when a supply chain disruption occurs, they hardly have any backup plans and lack time to seek alternative supplies, causing operational disruptions and reduced revenue.

### 2.3. Hypotheses development

*H1: Stringency Index of lockdown policy has a negative effect of firms' corporate performance*

The Stringency Index measures the strictness of the government's restrictive policies to prevent the Covid-19 epidemic. We calculate a weighted average of the workplace closure Stringency index of all foreign countries providing inputs for each industry in the host country as a proxy for supply chain disruption. During the Covid pandemic, Barro et al. (2020) raise the issue of the trade-off between lives and goods, and it is clear that such trade-offs are inevitable as a result of efforts to combat the pandemic and prevent the spread of infection. Its spread has led countries to implement policies that reduce real GDP, especially through restrictions on travel and trade. Research by Lasha and Mohammed (2023) concludes that strict public policies to tackle the pandemic have significantly deteriorated the financial performance of companies. Besides, the impact of the blockade not only affects the performance of domestic companies but also negatively affects companies in other countries (Aslam et al., 2022).

*H2: The interaction between Stringency Index and the level of demand for foreign inputs has a negative effect on firms' corporate performance*

This is the interaction variable between Stringencyindex and highlyexposed (highlyexposed=1 if the company's demand for foreign inputs is higher than the 75th percentile, and =0 otherwise). Together with the overall increase in foreign input dependence, are the accompanying risks that can be felt throughout the chain if one node is disrupted. Industries and countries that rely heavily on foreign inputs will be more severely affected when supply chains are disrupted. If these industries and countries lack adequate and stable supplies of key inputs, they will face difficulty in producing and supplying goods. When subject to the same strict blockade or the same risk of supply chain disruption, industries with a higher degree of dependence on foreign inputs tend to have lower business results.

Based on previous research results, the hypotheses *H3, H4, H5, H6, H7, H8* relating to the relationship between the firm's control variables, namely Total assets, Total liability, Short-term investment, Tobin's Q, ROA, Total debt-to-equity- D/E and business results, are determined in Table 1 below.

### 3. DATA AND METHODOLOGY

We extract the panel data from available datasets: the firm data from World Scope with industrial code from Standard Industrial Classification (SIC) dataset, the Multi-regional Input-Output table (MRIO, ADB), and Stringency Index (Hale, 2021).

There are two approaches to determine the interdependence of the supply chain. The first method is "tear down", which analyzes the supply chain by analyzing the value of individual components for source companies and their countries. In the research on Iphone products by Xing & Detert (2010), the authors find that China contributed 3.6% to the final export value of Iphone from the US in 2009. Nevertheless, this approach heavily relies on particular types of goods and companies, which makes it difficult to draw generalizations about the function of global supply networks.

The second method is ICIO, a crucial instrument in global supply chain analysis. It is based on the use of transnational input-output tables to define the roles of countries and industries in the supply of goods. First proposed by Wassily Leontief (1936), the ICIO treats each industry in a country as an upstream supplier, providing inputs for the final product of another industry in the target country. The inter-industry transactions that take place both inside and between nations can be viewed comprehensively using the ICIO approach. This method also allows to assess the degree of dependence on foreign inputs of a country or industry. This makes it easier to understand the dependency and impact of supply chain disruption.

Hence, in this study, the authors use the transnational input-output table to calculate supply chain intensity, the degree to which an industry in a host country depends on foreign inputs, following an approach similar to that of Krugman et al. (1995) and Timmer et al. (2014). The formula is as follows:

$$SCI_{ci} = \frac{\sum_{k \neq c}^N Inputs_{ki}}{Outputs_{ci}}$$

Where  $i$ ,  $c$ ,  $k$  are the industry, host country, and foreign country of the input, respectively.  $SCI_{ci}$  is the total quantity of inputs required by industry  $i$  in the host country  $c$  from other nations (i.e. all countries  $k$  other than the host country  $c$  in the study group's dataset), scaled following the total output produced by industry  $i$  in the host country  $c$ .

In this study, the authors gathered information on foreign inputs and outputs of 35 sectors across 6 Southeast Asian countries from ADB's 2018 Input-Output table. According to ADB data, to create the final unit of output, each Southeast Asian country needs inputs from other industries in other nations. The Philippines, Thailand, and Malaysia are significantly reliant on foreign inputs, whilst Singapore, Vietnam, and Indonesia are less dependent. In general, in comparison to other industries, the production of leather, leather goods, and footwear, as well as transportation, electrical, and optical equipment, requires more foreign inputs.

Also, in this paper, the authors use workplace closures, the Stringency Index developed by Hale et al (2021), to capture the severity of supply chain disruptions. The index has a scale from 0 to 100, with 100 denoting the nation with the tightest workplace closure policies. The research team's approach is comparable to that of Ersahin et al (2022) and Li et al (2020). Specifically, to quantify supply chain disruptions, our team calculates a weighted average of the workplace closure stringency index of all foreign countries providing input for each industry in the host country. To account for differences in the importance of certain foreign countries for each sector input in the host country, we use the total amount of foreign inputs as the weight to calculate the Index. The weighted average Stringency Index is as follows:

$$\text{StringencyIndex}_{ict} = \frac{\sum_{k \neq c}^N \text{StringencyIndex}_{kt} \times \text{Input}_{ick}}{\sum_{k \neq c}^N \text{Input}_{ick}}$$

Where  $i$ ,  $c$ ,  $k$ ,  $t$  are industry, host country, foreign country of input, and time, respectively. is a weighted stringency index representing the supply chain disruptions faced by industry  $i$  in host country  $c$  at time  $t$ . This index is zero for 2018 and 2019, before the pandemic.  $\text{Input}_{ick}$  is the amount of input in dollars that industry  $i$  in the host country  $c$  needs from a foreign nation  $k$  in 2018 (pre-shock data from ADB's ICIO table).  $\text{StringencyIndex}_{kt}$  is the Workplace Closure Stringency Index of foreign country  $k$  at time  $t$ .

We consider using one of three estimation models: pooled regression model (POLS), fixed effects model (FE) and random effects model (RE). The result of the Lagrange test shows a better fit for RE than POLS. We use the FE model according to the result of the Hausman test. Besides, we also test the possible defects of the model. Furthermore, we conduct the Chow test to compare the indices by the least squares method and draw conclusions about the reliability of the model. In addition, we also use the difference-in-difference (DiD) to better clarify the impact of the pandemic on corporate performance.

Table 1 presents the variable measurement and expectations for each hypothesis according to previous studies we synthesized.



**Table 1. Variable measurement and hypothesis**

Variables	Description	Expectation	Sources
Log_ Net sales or revenues	Total revenue (US\$)		
Stringency Index	Stringency index	-	Aslam et al. (2022)
Stringency exposed	Stringency index correlated with exposure	-	
Log_ Total assets	Total assets (US\$)	+	Marimin et al. (2015) Rani Salamah et al. (2020)
Log_ Total liability	Total liability (US\$)	-	Tsangyao Chang (2010)
Log_ Short-term investment	Short-term investment (US\$)	+	Dritsaki (2004) Tiwari (2011)
ROA	Return on asset (ROA) (%)	+	Faisal et al. (2018)
Tobin's Q	Equals the market value of a company divided by its assets' replacement cost (Tobin's Q ratio) (%)	-	Mitra & Adhikary (2017)
Total debt-to-equity- D/E	Total debt on equity (D/E) (%)	-	Misman & Ahmad (2011)

Source: Authors' compilation

## 4. RESULTS AND DISCUSSION

### 4.1. Summary statistics

**Table 2. Summary statistics**

Variables	Obs.	Mean	Sd.	Min	Max
Net sales or revenues	11,116	17.948	2.051	5.200	25.035
Stringency Index	11,116	31.877	32.035	0.000	67.800
stringency exposed	11,116	11.097	24.276	0.000	67.800
Total assets	11,116	18.757	1.943	8.904	25.737
Total liability	11,116	17.732	2.274	7.572	24.587
Short-term investment	11,116	20.098	4.851	0.000	31.133
Tobin's Q	11,116	3.516	116.580	-198.667	11,398.170
ROA	11,116	3.902	41.573	-3,428.500	134.784
Total debt-to-equity- D/E	11,116	95.137	1,868.014	-10,202.800	171,564

Source: Author's calculation from STATA

The minimum value of *Stringency Index* is 0.00 the maximum value is 67.8, the mean value is 31.877, and the standard deviation is 32.035.

The minimum value of *stringency exposed* is 0.00 the maximum value is 67.8, the mean value is 11.096, and the standard deviation is 24.276.

As can be seen from Table 2, the minimum value of *NET SALES OR REVENUES* is 5.200, which is an index of a firm from the Industrial group in Vietnam in 2018, while the maximum value is 25.035, one firm from Utility in Thailand in 2019, the mean value is 17.948, and the standard deviation is 2.051.

Regarding *TOTAL ASSETS*, the minimum value is 8.904, which is a firm from Industrial group in Malaysia in 2021, while the maximum value is 25.737. This is also a firm from Industrial group in Malaysia but in 2018, the mean value is 18.757, and the standard deviation is 1.943.

The minimum value of *SHORTTERM INVESTMENTS* is approximately 0. It comes from a firm in Industrial in Vietnam in 2019, the maximum value is 31.133, a firm of Transportation in Vietnam in 2021, the mean value is 20.098, and the standard deviation is 4.851.

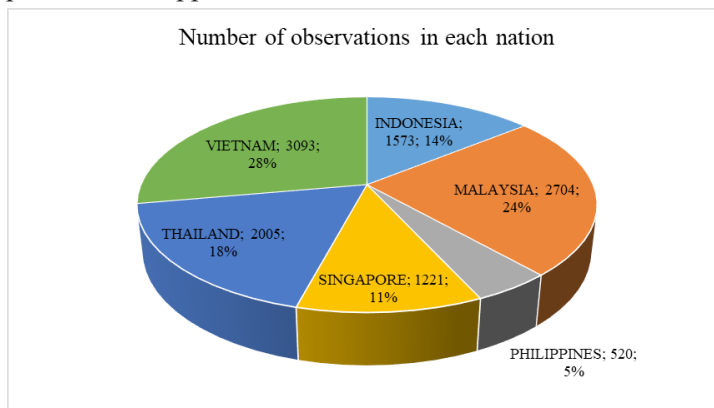
Finally, the minimum value of Tobin’s Q ratio, the minimum value is -198.667, which comes from a firm of Other finance in Vietnam in 2019, the maximum value is 11398.170, an enterprise from Bank group in Indonesia in Vietnam in 2018, the mean value is 3.516, and the standard deviation is quite significant at the level of 116.580.

Regarding *RETURN ON ASSETS (ROA)*, the minimum value is -3428.5, the maximum value is 134; the expectation value is 3.902 and the standard deviation is quite significant at the level of 41.573.

**4.2. Sample descriptive statistics**

**4.2.1. Sample statistics by year and nations**

As can be seen from Figure 1 below, data collected from Vietnam contribute the largest part with 3093 observations, making up 27.82% of the total number of observations. Ranked second is Malaysia with 2704 observations, or 24.33% of the total number of observations collected. Observations in the case of Thailand and Singapore count for respectively 18.04% and 10.98% of the overall sample. The nation with the fewest observations in this paper is the Philippines with 520 observations.



**Figure 1: Number of observations in each nation**

*Source: Authors’ compilation*

**4.2.2. General industry classification**

Each company is ascribed with a SIC (Standard Industrial Classification) code, available on Worldscope. Such codes were developed by the U.S. government, and they are assigned in accordance with each business segment’s contribution to net sales or revenues, in descending order of importance. Furthermore, each company is given a General Industry Classification, which specifies whether it is an industrial, utility, transportation, banking, insurance, or other financial enterprise.

**Table 3. Industries statistics**

GENERAL INDUSTRY CLASSIFICATION	Total	Percent	Cum.
Industrial	8976	80.75	80.75
Utility	704	6.33	87.08
Transportation	541	4.87	91.95
Bank/Savings & Loan	9	0.08	92.03
Insurance	9	0.08	92.11
Other Financial	877	7.89	100.00

*Source: Authors’ compilation*

From the table above, it can be seen that the Industrial Sectors accounted for the highest proportion in this study with 8976 observations, 4 times higher than the other sectors combined. Ranked second

with a rate of 7.89% are 877 observations from other Financial sector. The Utility industry includes 704 observations, accounting for 6.33%, while such a number in the case of Transportation sector is 4.87%. The last two sectors are Banking and Insurance industries with the same ratio of 0.08% of the total sample.

#### 4.2.3. Stringency at home

The Stringency Index is a metric used to measure the tightness level of a country’s policies in response to the COVID-19 pandemic. This index is determined on a scale of 0 to 100, with a higher score indicating a stricter policy.

**Table 4. Stringency at home**

	<b>INO</b>	<b>MAL</b>	<b>PHI</b>	<b>THA</b>	<b>VIE</b>	<b>SIN</b>
Year 2020	62.18	59.36	71.30	48.81	61.44	50.44
Year 2021	58.15	69.10	72.81	55.54	69.13	48.96

*Source: Authors’ compilation*

Overall, it can be seen that the Stringency Index for Southeast Asian Countries has generally witnessed a downward trend from 2020 to 2021, suggesting that governments have become less stringent in their pandemic response policies over time. This could be due to factors such as increased vaccination rates or a decrease in the number of infection cases in some countries.

The Philippines has the highest Stringency Index for both 2020 and 2021, at 71.3 and 72.8 respectively, indicating that the government in this nation has taken more stringent pandemic response measures than other countries in the region. This may be because the Philippines had a relatively high number of COVID-19 cases and deaths compared to other Southeast Asian countries.

In both 2020 and 2021, Stringency Index is the lowest in Singapore, indicating that its government has taken less stringent pandemic response measures than its counterparts. However, it is worth noting that Singapore had a relatively low number of COVID-19 cases and deaths compared to other countries in the region, suggesting that their approach may be effective.

### 4.3. Discussion

#### 4.3.1. Baseline results

**Table 5. Regression results**

Variables	(1)	(2)	(3)	(4)
STRINGENCYINDEX	-0.00234*** (0.000199)	-0.00112*** (0.000202)		-0.0148*** (0.00965)
stringencyexposed	-0.000617* (0.000359)	-0.000574 (0.000400)		0.0169 (0.0140)
log_TOTALASSETSUS	0.705*** (0.0725)		0.653*** (0.205)	0.689*** (0.0985)
log_TOTALLIABILITY	0.0826** (0.0382)		0.0696 (0.0529)	0.0571 (0.0482)
log_SHORTTERMINVESTMENTS	0.00410 (0.00278)		-0.000185 (0.00293)	0.000665 (0.00450)
RETURNONASSETSROA	0.00103 (0.00164)		0.00571*** (0.00176)	-0.000416 (0.000542)
TOBINSQ	-0.000352*** (8.21e-05)		0.00319* (0.00170)	-0.000323 (0.00225)

TOTALDEBTCOMMONEQUITY	-5.28e-06** (1.077)		-9.01e-06*** (3.10e-06)	-4.38e-06 (5.32e-06)
Constant	3.256*** (0.388)	17.99*** (0.00569)	4.504 (3.712)	4.504*** (1.397)
Observations	11,116	11,116	5,569	5,547
R-squared	0.6936	0.0028	0.5841	0.5905
Clustering	Firm	Firm	Firm	Firm
Sample	2018 to 2021	2018 to 2021	2018&2019	2020&2021

Note: Columns 1&2 presents the results of 6 Southeast Asian Nations in the sample. Column 3 shows the results of the pre-pandemic period (2018-2019). Column 4 illustrates the results of the post-pandemic period (2020-2021).

**Source: Author's calculation from STATA**

The results show that the Stringency index variable has a negative coefficient and is significant, which is consistent with the expectations of Aslam et al. (2022). This can be explained that if the Stringency index in the policy to deal with the Covid-19 pandemic is higher, countries will tend to limit trade and exchange; thus reducing revenue of enterprises.

The stringencyexposed interaction variable has a negative coefficient, which implies that in high-growth firms, the negative effect of disruption on firm performance is weaker than in low-growth firms.

As total assets increase, the revenue growth rate also increases. This result is similar to the study of Marimin et al (2015) when analyzing the growth of Islamic Sharia banks and getting the results that the bank's growth has increased along with the increase in assets.

The coefficient of the Total liabilities is positive, contrary to the author's expectation. However: "Debt can facilitate or determine economic growth depending on the level of debt" (Chang, 2010). Therefore, much corporate debt does not mean a decrease in firm revenue growth.

The coefficient of the investment variable in the short run is not statistically significant, which is contrary to the expectations of the author and Dritsaki (2004), and Tiwari (2011) when arguing that short-term investment not only helps promote private sector investment but also increase GDP in the long run.

The coefficient of the ROA variable is not statistically significant, which is entirely contrary to the author's expectations and the point of view of Faisal et al. (2018) when arguing that the larger the ROA, the better the financial performance because the rate of return is increasing.

The coefficient of the variable TOBIN's Q is negative, which is in line with the expectations of the authors and Mitra & Adhikary (2017). This can be explained that, if the company's Tobin's Q is more extensive, the company actively promotes investment, but during the Covid-19 period, the supply chain is disrupted; therefore, the company could not expand production resulting in negatively affected revenue.

The coefficient of the Debt-to-equity is negative, this is entirely consistent with the expectations of the authors and the study of Misman & Ahmad (2011). This means that the larger the company's percentage of liabilities, the slower its revenue growth. When a business has bad debt, it is forced to make provision for risks and record it as an expense, which will increase costs and reduce profits.

To measure the impact of supply chain-related factors on the company's revenue growth separately, the authors record the results in column 2. At this point, the stringencyexposed interaction variable does not affect the company's revenue growth. When removing the data for two years 2020 and 2021 (column 3), and two years 2018 and 2019 (column 4), the results show that in column 4, the severity index has

an effect. This shows that whether this policy is tight during the epidemic period will also contribute to economic growth. Therefore, firms need specific and clear development policies if they want to grow and recover the economy

#### 4.3.2. Difference-in-difference estimation results

To test our hypothesis that firms considered highly exposed to supply chain disruption would experience lower sales growth than lowly exposed firms, we employ difference-in-difference (DiD) estimation to examine the correlation between supply chain disruption and firm sales growth.

Where is the sales growth rate for firm  $f$  in industry  $i$  locating in country  $c$  at time  $t$ .  $year_1$  is a dummy variable that equals 1 if the observation time is in the pandemic period (2020-2021), and 0 otherwise.  $highlyexposed$  is also a dummy variable that equals 1 if the SCI of its industry exceeds the 75th percentile in the distribution of SCI in the home country  $c$  in 2018. The interacted variable between  $HighlyExposed$  and  $StringencyIndex$  is considered as  $StringencyExposed$ .  $StringencyIndex$  is the Weighted Average of the workplace closure index at time  $t$  of all input countries that provide goods to industry  $i$  in country  $c$  with the number of inputs from each input country used as weights.

**Table 6. Difference-in-difference estimation results**

Variables	(1)
$year_1$	-1.910***
	(0.701)
$highlyexposed$	-0.534***
	(0.0571)
$year_1highlyexposed$	1.700*
	(1.010)
$stringencyexposed$	-0.0282*
	(0.0158)
STRINGENCYINDEX	0.0288***
	(0.0109)
Constant	18.19***
	(0.0337)
Observations	11,116

Source: Authors' compilation

The coefficient of  $year_1$  is negative and significant, suggesting the downtrend in the firm's net sales or revenues following the time. This can be explained by the fact that the Covid-19 pandemic deteriorated from 2020 to 2021, harming the corporate performance of many firms in general.

The coefficient of  $year_1highlyexposed$  is positive and significant, showing that the pandemic can have a good impact on several firms' corporate performance. For instance, in Vietnam, Finance, Real estate and Food & Beverage still have effective performance, despite the Covid-19 pandemic.

Using DiD estimation, we conclude that the firm's revenue tends to decrease under the circumstances of the pandemic. However, several firms can still grow positively despite the influence of the pandemic. This can be explained that there may be other determinants that affect the growth of corporate performance, irrespective of the pandemic.

**4.3.3. Regression results by industry**

**Table 7. Regression results by industry**

	<b>Industrial</b>	<b>Utility</b>	<b>Transportation</b>	<b>Bank</b>	<b>Insurance</b>	<b>Others</b>
Stringency index	0.005***	-0.001***	-0.001***	-0.000***	-0.000***	-0.002***
stringencyexposed	0.003***	-0.000***	-0.000***	-0.000***	-0.000***	-0.001***
Stringencyathome	-0.005***	0.002***	0.001***	0.000***	0.000***	0.003***
Observations	8,976	704	541	9	9	877

*Source: Authors' compilation*

As can be observed from Table 5, there are apparent contradictions regarding the impacts of Covid-19 pandemic between firms of the Industrial sector and those from the other sectors, namely: Utility, Transportation, Bank, Insurance, and Others.

Specifically, regarding the Industrial sector, Stringency Index of lockdown policy poses a positive impact on corporate performance, whereas such a relationship between domestic Stringency (stringencyathome) and firms' outcomes is reversed. This may be due to the fact that the stricter the domestic lockdown measures, the less vulnerable the Industrial companies become when being exposed to an economic shock. As a result, the revenue of such businesses may not be severely affected. However, if the domestic country is strict in the lockdown policy in response to the Covid pandemic, enterprises in this industry will be incapable of finding materials sources, as well as face difficulty in exporting to potential markets. To be more specific, the Zero Covid policy of China, together with its extreme blockade, has worsened supply chain disruptions in Vietnam. A series of factories and warehouses were shut down, truck deliveries were delayed, and there was a shortage of container trucks... Consequently, Vietnamese businesses, which heavily depend on the Chinese market, are interrupted in both the export and import of raw materials. It can be seen that, without mentioning the Russia-Ukraine conflict, the shortage of raw materials supply due to the congestion of world seaports as well as the fluctuations in the epidemic in China has exposed the Industry sectors to significant difficulties.

Regarding the remaining sectors, Stringency index of lockdown measures exerts an adverse effect on business performance, while domestic stringency index (stringencyathome) poses a positive impact. Such relationships are contrary to those of the Industrial sector discussed above. This indicates that if the domestic Stringency index rises, it will be challenging for businesses, especially those in Utility and Transportation sectors, to seek raw materials sources, as well as to expand their market share. Compared to other sectors, Utility and Transportation are more susceptible to the economic shock during the pandemic. Regarding Transportation, it is reasonable that the profit of Transportation companies are acutely influenced. Due to the pandemic, supply chains are disrupted; airway, railway, seaway, and land transportation services are severely affected. Nevertheless, such an impact remains at a quite low level (0.001), which may be due to a relatively small number of such firms compared to the number of those in the Industrial sectors, thereby leading to a discrepancy in research results.

**5. CONCLUSION**

We studied 11,116 observations from 2018 to 2021 in order to answer the question of how supply chain disruption affects the performance of various firms in Southeast Asia. Our research results show that the higher the country's stringency index in the policy to deal with the Covid-19 pandemic, the more negatively businesses' revenue is affected. Control variables such as total assets and total liabilities have a positive influence, in contrast to Tobin's Q, D/E, which have a negative impact on revenue growth. Also according to the research findings, the stringency index of the blockade policy has a beneficial influence

on the business performance of enterprises in the Industry group, whereas the domestic stringency index shows the opposite effect. Other industry groups, however, exhibit these linkages in the opposite way.

Our research results indicate that it is crucial for firms to monitor and evaluate debt-related indicators and policies in reaction to the COVID pandemic, as well as alter their tactics to take into account differences in disease-prevention practices among regional and international countries. We propose some specific recommendations as follows.

First, businesses can establish strategic base locations to minimize risks associated with restrictions on cross-border mobility. This strategy requires a significant amount of restructuring, which is often appropriate for companies with worldwide infrastructure and may pose a long-term impact. However, blockades in different parts of a country may limit the effectiveness of this strategy.

Additionally, businesses can concentrate on creating a flexible supply station. To achieve this, it is advisable that companies diversify their material supply through multiple-sourcing or entering into flexible contracts with suppliers that allow them to adjust order quantities and delivery time windows.

Another option for businesses is to implement digital transformation throughout the entire operating system to improve supply chain agility. This aids businesses and organizations in getting a comprehensive picture of the entire value chain, from the processing of raw materials to final consumption.

Also, according to the findings, firms need to be more cautious when making investment decisions in the event of a supply chain disruption because investment in materials and equipment may result in a lower return on investment. Instead, employ a reuse strategy where assets are moved from underperforming sectors to assist stronger-performing areas in order to reduce waste.

Companies also need to modify their strategies to align with regional governments' pandemic response plans. This may entail changing product development, sales tactics, or marketing methods. For example, businesses can leverage the influence of social media, such as starting a trend on social networking sites to promote a sales promotion. This strategy does not necessitate large resources due to the fact that viewers will spread the word about the product.

In general, an unusual situation in the supply chain is characterized by a high level of uncertainty and a dearth of reliable information (Chen et al., 2010). In other words, if the information was readily available, timely, and highly accurate, the severity of the disruption would be lessened. As a result, it is necessary to give priority to employing modern technologies such as EDI (Electronic Data Interchange) or ERP (Enterprise Resource Planning).

There exists some shortcomings to this study. Due to limited available statistical data, we only studied 6 countries in Southeast Asia and the latest data is of the year 2021. In addition, as the severity of supply chain disruption in this paper is based on the industry's supply chain disruption, we only study single-industry companies. Future research may be particularly interested in the business performance of Southeast Asian businesses during the recovery period after the pandemic (from 2022 onwards). Therefore, we suggest a new direction based on forecasting the business performance of the business and then comparing it with the actual results.

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## HOW DOES THE ACCESS TO FINANCE IMPACT BANK'S PROFITABILITY: THE CASE OF VIETNAM

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*ABSTRACT: Financial inclusion, especially the access to finance aspect, is considered as an important element in ensuring sustainable growth of a nation. To investigate the impact of the access to finance on profitability of the Vietnamese commercial banks, this paper applies Pooled OLS model for analysing the relationship between the access to financial services dimension (namely the number of ATMs, bank branches, point of sales) and bank profitability (measured by ROAE) during the period from 2011 to 2020. Moreover, the study also takes into account macro elements such as GDP, inflation rate as well as bank internal factors including bank size, liquidity and capital adequacy. The results show that branch expansion adversely influences the profitability of Vietnamese banks while no impact has been found from the number of ATMs and POSs. The importance of government supports is also expressed in implementing policies to improve the bank's profitability based on the enhancement of financial inclusion in the particular context of Vietnam.*

*Keywords: Financial Inclusion; Accessibility Aspect; Bank profitability; Commercial banks.*

### 1. INTRODUCTION

Commercial banks' primary function is to provide loans to borrowers and collect deposits from savers, hence, optimise capital distribution. Banks are also necessary for the payments system as funds transfer is processed through banks. Moreover, banks also generate money from the spread between interest revenue and expense, trading income, fees for customer services and financial product sales. Therefore, banks play a crucial part in ensuring the stability, efficiency and prosperity of the whole financial and economic system.

By improving the quality and access to financial services, the banking sector can allocate optimal resources while lowering the cost of financing, enhancing capital accumulation and economic growth. Simultaneously, banks can attract and maintain customers, thus improving their profitability. Financial inclusion can be used to measure supply of adequate and quality financial services. Financial inclusion refers to the accessible capabilities of individuals and institutions to useful and affordable financial products and services (The World Bank, 2011). The Global Partnership for Financial Inclusion (GPII) 2016 report suggests three aspects of financial inclusion including access to financial services, usage of financial services and quality of the products and service delivery. Banking sector is a driving force for financial inclusion activities while simultaneously, promoting financial inclusion helps enhance bank performance. As banks always consider profitability as a top priority during their operation, it is vital to improve bank profitability through factors such as financial inclusion.

After the COVID-19 pandemic, many individuals and businesses are negatively affected. The increased loan demands to recover business and production activities create an excellent incentive for commercial banks to enhance financial inclusion, contact all potential customers, increase financial performance and support the healing of the national economy.

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Additionally, the Government has shown strong support and interest in financial inclusion implementation through plans and policies including Decision No. 2545/QD-TTg approving the Scheme on Non-Cash Payment Development in Vietnam for the 2016-2020 period; Decision No. 1726/QD-TTg approving the scheme on an increase of accessibility to banking services for the economy; the National Financial Inclusion Strategy to 2025, with a vision to 2030 signed by the Prime Minister in 2020.

These aforementioned emphasises the significance of this study in examining the impact of financial inclusion on bank profitability. Due to the limitations in public data and the specific context of the Vietnamese banking system, the study uses only accessibility dimension as a proxy of financial inclusion, including the number of bank branches, POS and ATMs. ROAE is used to evaluate bank profitability. The study also takes into account macro factors such as GDP, Inflation rate and bank-specific elements including bank size, liquidity, capital adequacy. To obtain the most accurate approximation, 200 observations are collected from 20 Vietnamese commercial banks from 2011 to 2020. The research uses Pooled OLS regression models and several postestimation tests including the variance inflation factor (VIF), the Breusch-Pagan, the Wooldridge and the Ramsay Reset test. To handle autocorrelation, the study applies the Newey-West method. This paper consists of six main parts. Section 1 is introduction. Section 2 reviews theoretical framework and literature. Section 3 focuses on data and methods. Section 4 discusses empirical results. Section 5 checks the robustness. Section 6 provides conclusions.

## **2. THEORETICAL FRAMEWORK AND LITERATURE REVIEW ON FINANCIAL INCLUSION AND BANK PROFITABILITY**

### **2.1. Theories**

Firstly, financial intermediation theory has been deployed to explore financial inclusion in various research publications (Kamal et al., 2021; Kalunda & Ogada, 2019 and Misati et al., 2019; ). It was implied that banks serve as a bridge between customers and the society. It concentrated on banks' contributions to the effective distribution of funds and the decrease of market friction. This can be taken to suggest that creating trustworthy information and lowering transaction costs result in financially sound institutions.

Secondly, the special agent theory will be used to examine how this relationship affects the goal of financial inclusion. This theory implied a special connection between the principal and the agent. The national authority is regarded as the principal, and local banks are regarded as the special agent.

### **2.2. Literature review of the impact of financial inclusion on bank profitability**

Numerous earlier studies have looked into the factors affecting banks' profitability around the globe. The factors that affect the performance of banks can be divided into two categories: macroeconomic variables (inflation, GDP growth rate) and bank-specific variables (capital adequacy, bank size and liquidity). According to Francis (2013), inflation has a negative effect on bank performance. However, Gul et al. (2011) suggested that external factors (GDP, inflation) significantly, positively influence on bank performance. Rachdi (2013) found that GDP, adequate capital, and liquidity had a beneficial effect on bank performance. As for adequate capital, it is indicated to significantly and positively contribute to bank performance (Kumar et al., 2020). In terms of liquidity, Kawshala and Panditharathna (2017) assumed an insignificantly negative influence on Sri Lankan bank profitability, however Bitar et al. (2020) concluded that liquidity is a key factor in determining the performance of Islamic banks. According to Kumar et al. (2021) and Al-Eitan et al. (2022), bank size is a key factor in determining profitability. Furthermore, bank size is asserted to have a significantly positive link with bank performance (Dietrich & Wanzenried, 2011).

Several studies have been undertaken using various databases to examine the correlation between financial inclusion and bank performance. As a result, there is controversy over the impact of financial inclusion metrics on bank profitability. Nonetheless, the majority of conclusions agreed on the critical impact of financial inclusion towards bank profitability. Al-Eitan, Al-Own, and Bani-Khalid (2022) used FE models and multiple linear regression model to analyze data from 13 banks in Jordan over a 10-year period, from 2009 to 2019) in order to look at indicators of financial inclusion. According to the study, bank profitability is significantly and negatively impacted by the volume of loan accounts as well as size of deposits, while the number of branches and ATMs had no noticeable impact. The support for this study about the value of financial inclusion in banks was simultaneously highlighted in the paper conducted by Kumar, Thrikawala, and Acharya (2021). A database containing 122 Japanese banks was studied by Kumar, Thrikawala, and Acharya in 2021. The authors used OLS, FE models, and GMM estimation techniques to demonstrate the significance of financial inclusion in economic activity since there is a positive correlation between bank profitability and the number of branches, despite the fact that the number of loan accounts and ATMs has no impact on bank profitability. Shihadeh et al. (2018), on the other hand, investigated the link between financial inclusion and Jordanian bank performance using an OLS regression model with annual data from 13 commercial banks from 2009 to 2014, indicating that the number of ATMs and credit cards increases bank profitability. In other words, the authors argue that financial inclusion can boost bank profitability.

Nonetheless, in the field of our research, only a few studies have been conducted on this topic to thoroughly examine the financial inclusion of Vietnam. Nguyen (2018) investigated the adverse effects of financial inclusion on monetary policies. Van et al. (2019) studied 159 countries, including Vietnam, to support the favorable association between financial inclusion as well as economic growth. Pham, Tran, and Vu (2020) emphasized the vital role of financial inclusion in the Vietnamese market by researching the impact of financial inclusion on other countries, specifically India, Brazil, and Malaysia. Despite its low mobile transaction volumes in comparison to other low- and middle-income countries, Tran, Nguyen, and Nguyen (2019) investigated the favorable influence of financial inclusion upon online payment transactions in particular. Vo et al. (2020) stated a link between financial inclusion and bank profitability, which they discovered when examining the impact of corporate social responsibility on loyalty among consumers in the Vietnamese bank industry. Furthermore, Vo and Nguyen (2021) investigated the impact of financial inclusion on Vietnam's bank performance as part of a database of 13 Asian emerging nations.

To sum up, the outcomes from a few papers which have been done to research the relationship between bank profitability and financial inclusion showed a mixed picture of relationships between financial inclusion indices and bank profitability, ranging from positively to negatively, significant to statistically insignificant.

### **Hypothesis development**

**The number of ATMs (ATM):** Itah and Ene (2014); Akhisar et al. (2015); Chaarani and Abiad (2018) discovered that ATMs might efficiently boost bank expansion. According to them, in recent years, many banks have attempted to expand their ATM network because this innovative technology is widely used by bank customers. As a result, the bank's financial performance improves, resulting in a competitive advantage.

**Hypothesis H1: There exists a statistical and significant relationship between the number of ATMs and bank profitability in Vietnam**

**The number of bank branches (BRANCH):** The development of bank branch networks, according to Shihadeh and Liu (2019); Farooq et al. (2021), leads to a rise in bank profitability. Kumar, Thrikawala,

and Acharya (2021) agreed with the same conclusion. According to them, a growth in the number of bank branches leads to an increase in the number of clients, which in turn increases deposits, loan portfolio, and risk diversification.

**Hypothesis H2: There exists a statistical and significant relationship between the number of bank branches and bank profitability in Vietnam**

**The number of POSs (POS):** Akhisar et al. (2015) used panel data methods to investigate electronic banking services in 23 developed and developing countries from 2005 to 2013. They discovered that the number of POSs had a considerable negative impact on ROE.

**Hypothesis H3: There exists a statistical and significant relationship between the number of POSs and bank profitability in Vietnam**

**Bank size (SIZE):** In terms of the bank size variable, Gul et al. (2011); Alper and Anbar (2011); Bhattarai (2017); Bitar, Pukthuanthong and Walker (2020) found out the significant positive relationship between bank size and ROE. They discovered that the number of POSs had a considerable negative impact on ROE.

**Hypothesis H4: There exists a statistical and significant relationship between bank size and bank profitability in Vietnam**

**Bank Liquidity (LIQUID):** In terms of liquidity, Rahman, Hamid, and Khan (2015) investigated the relationship between liquidity and bank performance in 25 Bangladeshi banks from 2006 to 2013. This encouraging finding is supported by Ebenezer, Oma, and Kamil (2017), as well as Bitar, Pukthuanthong, and Walker (2020).

**Hypothesis H5: There exists a statistical and significant relationship between bank liquidity and bank profitability in Vietnam**

**Capital adequacy (CAP\_AD):** Moving on to capital adequacy, Amahalu et al. (2017); Olalere et al. (2017) discovered that capital sufficiency has a favorable and significant impact on bank profitability. As a result, an increase in chosen banks' capital leads to an increase in return on equity. It implies that banks should use shareholder cash to improve bank performance and increase returns.

**Hypothesis H6: There exists a statistical and significant relationship between capital adequacy and bank profitability in Vietnam**

**Gross domestic product growth rate (GDP):** Gul, Irshad, and Zaman (2011) discovered that GDP had a direct and significant impact on ROE when researching factors affecting bank profitability in Pakistan. According to the study, rapid economic expansion boosts profitability in Pakistan's banking sector. In the same vein, Rachdi (2013) and Bhattarai (2017) discovered that the GDP growth coefficient is positively and strongly connected to ROE.

**Hypothesis H7: There exists a statistical and significant relationship between GDP and bank profitability in Vietnam**

**Inflation rate (INF):** According to Azam and Siddiqui (2012), Owoputi, Kayode, and Adeyefa (2014), and Rahman, Hamid, and Khan (2015), the inflation rate has a considerable and negative impact on ROE. This study implies that banks earn less during periods of excessive inflation.

**Hypothesis H8: There exists a statistical and significant relationship between inflation rate and bank profitability in Vietnam**

### 3. RESEARCH METHOD

#### 3.1. Data

The study employs a panel database containing 200 observations from the top 20 Vietnamese commercial banks in terms of capitalization from 2011 to 2020. All selected banks meet the criteria of having fully published their financial statements under the guarantee of independent auditing companies and having enough data to calculate the variables in the model during a 10-year period from 2011 to 2020. The financial inclusion factors and bank are gathered and calculated from the financial statements of the Vietnam Bank Card Association and the bank. Other control variables, such as GDP, inflation, and interest rates, are provided by the General Statistics Office (GSO) and the State Bank of Vietnam (SBV). Research data is secondary data that is organized and processed using Stata 15. To eliminate the impact of outliers, we winsorized all data except the number of branches, bank size, and liquidity at the 5th and 95th percentiles.

**Table 1: Measurement of variables and expected signs of impacts**

Variables	Description	Expected sign
ROAE	Net income/Average shareholders' equity	
ATM	Number of ATMs/100,000 adults	+
BRANCH	Number of bank branches/100,000 adults	+
POS	Number of POSs/100,000 adults	-
SIZE	ln(Total assets)	+
LIQUID	Totals loans/Total assets	+
CAP_AD	Total equity/Total asset	+
GDP	Yearly Vietnam GDP growth rate	+
INF	Yearly percentage change in CPI	-

Source: Synthesised by authors

#### Dependent variable:

Profitability is an important component in ensuring a bank's lucrative, appealing, and efficient development. Net interest margin (NIM), return on equity (ROE), and return on assets (ROA) are the most often utilized profitability indicators. In this study, return on average assets (ROAE) is employed as a measure of bank profitability from the standpoint of accessibility. ROAE is determined as a percentage by dividing net income by average shareholders' equity. ROAE is selected as an indication of bank profitability because it shows the potential to produce bank profits on all capital sources, regardless of which capital source has the same value.

Furthermore, using ROAE, it is possible to compare the performance of banks with the same risk because this index excludes changes in tax policy as well as financial leverage used by banks (Kupiec and Lee, 2012).

#### Independent variables:

**Financial inclusion variables:** From the annual available dataset, four financial inclusion variables were collected, including the number of ATMs per 100,000 adults, the number of bank branches per 100,000 people, the number of POSs per 100,000 adults, and the number of cards per 1,000 adults. In particular, the number of ATMs, POSs, and branches is indicated for a given number of adults' financial services approach.

#### Control variables:

In this analysis, both bank-specific and macroeconomic factors were collected. Liquidity, bank size, and capital adequacy ratio are bank-specific characteristics. The macroeconomic variables, on the other hand, are the GDP growth rate and the inflation rate.

The variables in the research model are explained as in Table 1.

### 3.2. Model specification

We estimated the following model:

$$ROAE_{it} = \beta_0 + \beta_1 ATM_{it} + \beta_2 BRANCH_{it} + \beta_4 POS_{it} + \beta_5 GDP_{it} + \beta_6 INF_{it} + \beta_7 SIZE_{it} + \beta_8 LIQUID_{it} + \beta_9 CAP\_AD_{it} + u_{it}$$

where the subscript  $i$  refers to the bank and  $t$  refers to the time period; ROAE is the dependent variable and refer to the profitability of the bank; ATM, BRANCH, and POS are the independent variables and refer to the financial inclusion of the country; SIZE, LIQUID, and CAP\_AD are bank-specific control variables; INF and GDP are country-specific macroeconomic control variables; and  $u_{it}$  is the error term.

### 3.3. Analysis techniques

The data analysis technique used in this research is the regression for panel data. Three types of panel regression models are commonly used, which are Pooled OLS (POLS) model, the Fixed Effects (FE) model and Random Effects (RE) model.

The Fixed-Effect technique tackles estimating concerns linked to unobserved heterogeneity (individual firm characteristics) across companies, and it is acceptable when the unobserved heterogeneity is stable throughout time for a given company (Schultz, Tan, & Walsh, 2010). Unlike the Fixed-Effect model, the Random-Effect model lowers variability within the sample by partly pooling the data and analyses the changes in error terms across particular businesses and periods. The Hausman test is a commonly employed econometrics test in panel data research for selecting between Fixed-Effect and Random-Effect frameworks. This test assesses the orthogonality of predicted effects and regressors, and was introduced by Hausman in 1978.

In order to choose whether Pooled OLS model or the Random-Effects model should be used, the Breusch-Pagan Lagrange Multiplier Test (LM), Trevor Breusch and Adrian Pagan (1979) is used to check for the significant difference across units (panel effect). The present study aims to examine the presence of a significant variation across units, also known as panel effect. The null hypothesis elucidates the rationale behind selecting the pooled regression, while the alternative hypothesis provides justification for the acceptance of the Random-Effect model.

Ordinary least squares (OLS) regression is a statistical technique for estimating the connection between one or more independent variables and a dependent variable. Studies apply ordinary least-square regression (OLS) analysis to identify the link between financial inclusion and bank profitability, Kumar et al. (2021).

The Newey-West is utilised to correct standard error when heteroskedasticity and autocorrelation happened and to compare the findings of OLS with the Newey West method on secondary and simulated data, which was first employed by Newey, W. K., and K. D. West. (1987). This strategy was utilised in the previous study in analysing the link between financial inclusion and banks in the finance sector, Adeola, O., and Evans, O. (2017) and is regarded as an acceptable estimation approach to study the dynamic nature of connections, Swamy, V. (2014).

## 4. RESULT AND DISCUSSION

### 4.1. Descriptive statistics

Table 2 includes descriptive statistics for each variable, such as mean, standard deviation, minimum and maximum values, and Skewness. ROAE is the dependent variable; the others are independent variables,

which are broadly classified as financial inclusion factors and macroeconomic variables. The ROAE of Vietnamese banks ranges from -27.1% to 28.1%.

ATM has a lower volatility rate of 1.006 per 100,000 adults. Similarly, with a standard deviation of 0.713, there are 0.576 bank branches per 100,000 people. POS has a range of 0 to 117.251 per 100,000 adults, with a standard deviation of 24.806.

**Table 2: Descriptive statistics**

Variable	Mean	Std.Dev.	Min	Max	Skewness
ROAE	0.111	0.076	-0.271	0.281	-0.109
ATM	1.006	1.095	0.007	0.013	1.212
BRANCH	0.576	0.713	0.044	3.377	2.608
POS	12.824	24.806	0	117.251	2.489
SIZE	18.963	1.119	16.502	21.173	-0.098
LIQUID	0.574	0.139	0.147	0.805	-0.748
CAP_AD	0.087	0.044	0.042	0.462	3.927
GDP	0.060	0.012	0.029	0.071	-1.561
INF	0.050	0.047	0.006	0.181	1.999

*Source: Results from Stata 15*

With a standard deviation of 0.044, the average capital adequacy ratio (CAP\_AD) is 8.7%. The SIZE, on the other hand, has an average of 18.963 and a standard deviation of 1.119. The average liquidity ratio is 57.4%, ranging from 14.7% to 80.5%. In terms of distribution, SIZE and LIQUID are considered very balanced.

Throughout the study period, the GDP fluctuated dramatically. Inflation varies widely, with a low of 0.6% and a high of 18.1%. With a standard deviation of 0.028, the average interest rate is 7.6%. INF has a positive skewness. A positive skewness suggests that the right-handed tail is greater in size than the left-handed tail. In the case of GDP, the opposite was true.

#### 4.2. Correlation matrix

Table 3 displays the correlation matrix between independent variables. The table shows that there are relatively low data correlations among the independent variables, indicating that there are no multicollinearity problems.

**Table 3: Correlation matrix**

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) ROAE	1.000								
(2) ATM	0.234 (0.001)	1.000							
(3) BRANCH	0.062 (0.386)	0.808 (0.000)	1.000						
(4) POS	0.201 (0.004)	0.758 (0.000)	0.456 (0.000)	1.000					
(5) GDP	-0.044 (0.534)	0.007 (0.916)	-0.004 (0.957)	0.051 (0.472)	1.000				
(6) INF	0.035 (0.626)	-0.069 (0.333)	-0.030 (0.668)	-0.123 (0.084)	0.017 (0.811)	1.000			



(7) SIZE	0.424 (0.000)	0.826 (0.000)	0.681 (0.000)	0.693 (0.000)	-0.036 (0.618)	-0.197 (0.005)	1.000		
(8) LIQUID	0.277 (0.000)	0.412 (0.000)	0.484 (0.000)	0.292 (0.000)	-0.006 (0.938)	-0.341 (0.000)	0.471 (0.000)	1.000	
(9) CAP_AD	-0.145 (0.041)	-0.344 (0.000)	-0.341 (0.000)	-0.257 (0.000)	-0.067 (0.344)	0.083 (0.245)	-0.543 (0.000)	-0.123 (0.083)	1.000

Source: Results from Stata 15

Table 3 shows a positive association between the dependent variable ROAE and the independent variables ATM, POS, SIZE, and LIQUID, with correlation values of 0.234, 0.201, 0.424, and 0.277 at the 5% significance level, respectively. The remaining independent variable is CAP\_AD which has a negative association, with a correlation coefficient of -0.145 at the 5% significance level. At the 5% significance level, variables BRANCH, GDP, and INF are not statistically significant.

### 4.3. Empirical Results

**Table 4: Regression results from Pooled OLS, REM and Newey-West models**

Variables	Pooled OLS	REM	Newey-West
<b>ATM</b>	0.003 (0.012)	-0.0102463 (0.0157)	0.003 (0.014)
<b>BRANCH</b>	-0.062*** (0.012)	-0.069252*** (0.019)	-0.062*** (0.011)
<b>POS</b>	-0.0003998 (0.000)	-0.0002966 (0.0003)	-0.0003998 (0.000)
<b>SIZE</b>	0.057*** (0.008)	.0786056*** (0.011)	0.057*** (0.009)
<b>LIQUID</b>	0.153*** (0.04)	.1408515*** (0.047)	0.153*** (0.045)
<b>CAP_AD</b>	0.191 (0.126)	.1217894 (0.118)	0.191 (0.150)
<b>GDP</b>	-0.036 (.371)	.0108769 (0.321)	-0.036 (.368)
<b>INF</b>	0.411*** (0.101)	.4868271*** (0.091)	0.411*** (0.116)
<b>Constant</b>	-1.054*** (0.162)	-1.441864*** (0.197)	-1.054*** (0.178)
<b>Number of observations</b>	200	200	200

\*\*\*, \*\*, \* denotes significant at 1%,5%,10%

Source: Results from Stata 15

The findings of the Hausman test suggest that the null hypothesis (H0) is supported, while the alternative hypothesis (Ha) is not, given that the computed p-value of 0.0947 surpasses the predetermined level of significance of 0.05. Based on the observed correlation between the ai findings of the Hausman

test and  $x_{it}$ , it is considered more appropriate to employ the Random Effect model. To investigate the relationship between the two models and derive accurate conclusions, the authors have presented the results of the Random Effects (RE) model and the Pooled Ordinary Least Squares (POLS) model in Table 4.

The impact of the ATM and GDP variables on the ROAE appears to differ from that observed in the POLS model, indicating a potential lack of consistency between the RE and POLS models. The findings indicate that the utilization of both the RE model and the POLS concurrently may result in incongruities in the examination and coherence of the research, particularly subsequent to conducting the Breusch-Pagan Lagrange Multiplier Test (LM). The statistical analysis resulted in a p-value of 0.811, which exceeds the predetermined significance level of 0.05. The acceptance of the null hypothesis occurs when the variance of the random effect is equal to zero, denoted as  $\text{Var}(u) = 0$ . In this scenario, the POLS model is preferred over the RE model.

Regarding to the POLS model, the results illustrate that the number of ATMs (ATM) has a positive impact on bank profitability with the coefficient of 0.003. The coefficient of the number of bank branches (BRANCH) and bank size are statistically significant for bank profitability. The number of POSs shows a negative but insignificant relationship with bank profitability with the coefficient of -0.0003, suggesting that this variable does not affect the profitability of banks in Vietnam.

This study also investigates the relationship between bank-specific variables and bank profitability. Liquidity has a positive relationship with ROAE and is statistically significant at a 1% significance level. With a correlation value of 0.153, we can affirm that banks with high profitability have high liquidity. The result examines the association between capital adequacy ratio and bank profitability. The coefficient of CAP\_AD is positive with the coefficient 0.191, in which we employed ROAE as a measure of profitability and applied the OLS estimation technique.

Turning to the country-level control variables, we observed the impact of gross domestic product growth rate (GDP) on ROAE. We also observed that the inflation rate (INF) increases bank profitability significantly at 1%. The coefficient of 0.411 indicates that every 1% rise in the inflation rate results in a 0.411% improvement in profitability.

#### 4.4. Robustness checks

**Table 5: Postestimation**

Breusch-Pagan test		Wooldridge test		Ramsay test	
Chi <sup>2</sup> test	Existence of heteroskedasticity	F-test	Existence of autocorrelation	F-test	Existence of omitted variables
0.06 (0.8116)	No	177.284 (0.0000)	Yes	0.47 (0.7057)	No

Tests were employed in the study to see if there is multicollinearity, autocorrelation, heteroskedasticity, or omitted variables. The variance inflation factor (VIF) is used throughout the paper to investigate multicollinearity. The test results reveal that the average VIF value is less than 5. Results in table 3, on the other hand, indicate no association coefficients more than 0.85. As a result, the authors conclude that the model does not suffer from multicollinearity.

The study used the Breusch-Pagan test to account for heteroskedasticity error. The results in Table 5 show that the model is unaffected by heteroskedasticity.

The Ramsey test is used in the examination for the omitted variable defect. The test results in Table 5 show that the model has no flaws in terms of missing variables.

The Wooldridge test is used to determine whether the model has an autocorrelation defect in terms of autocorrelation error. The results in Table 5 show that the model suffers autocorrelation defect.

After overcoming the autocorrelation defect using Newey-West regression, the results in Table 4 in Newey-West column indicate that the regression coefficients of the independent variables are unchanged. Among the independent variables, bank branches, POS and GDP are negatively related to bank profitability, but remaining variables like ATM, inflation, bank size, liquidity and capital adequacy have a positive correlation with bank profitability. In addition, the statistical significance of the Newey-West regression model is also consistent with the OLS model when it indicates that variables such as bank branches, inflation, bank size, liquidity are statistically significant in level 1%.

#### 4.5. Discussion

Regarding financial inclusion variables, the paper rejected Hypothesis H1 and Hypothesis H3 - which stated a statistically significant relationship between the number of ATMs and POSs toward bank profitability. Since banks equip many ATMs, they have to spend money on installing and sometimes fixing the equipment that can not be offset by the transaction fee at the ATM. This insignificant relationship is consistent with previous research, such as Kumar et al. (2021), when the authors could not find a significant relationship between bank profitability and the number of ATMs.

Our result related to POS is in line with (Itah and Ene,2014; Nwakoby et al.,2020), who also found no relationship between the number of POSs and return on equity for banks in Nigeria because most customers still prefer cash payment than use POS for all of such purposes. In Vietnam, the majority of adults still prefer cash transactions to other modern methods because people worry that they might not be able to carry the card all the time to withdraw money or pay at any time.

However, the paper accepted Hypothesis H3 since the regression result indicate that BRANCHES has a statistically significant impact on bank profitability. This result may come from the fact that the bank has spent a lot of money on expanding its network, investing in equipment and maintaining branches, but has not yet attracted the attention of customers. Bank branches in Vietnam often attract many customers and businesses in urban areas with diverse needs and large transactions. Consequently, banks will have to witness a decrease in profits since more new branches are open in many different places in Vietnam.

Moving onto bank-specific variables, the results illustrate that SIZE and LIQUID statistical and significant correlate with bank profitability. Hence, the paper accepted Hypothesis H4 and Hypothesis H5. This result is consistent with our expectations and the previous literature. Big banks in Vietnam frequently have a more substantial presence in the market and are constantly proactive in planning and monitoring market swings to respond swiftly; therefore, their profit growth rate is relatively high. The positive correlation between size and ROAE is consistent with previous studies by Alper and Anbar (2011) and Bhattarai (2017). Rachdi (2013) and Hirindu & Kushani (2017) stated that giant banks are more profitable because of economies of scale and scope. Profitability and liquidity are pragmatic markers of Vietnamese commercial banks' corporate health and performance and profit-oriented undertakings. A group of researchers states that higher liquidity has a positive effect associated with financial development (Rachdi, 2013; Hirindu & Kushani,2017). When it comes to banks in Vietnam, this is comparable to Rahman et al. (2015) and Ebenezer et al. (2017); here, this study reveals that liquidity and profitability are closely linked.

Since the coefficient of capital adequacy is not statistically significant, **Hypothesis H6** is rejected. It can be seen that, with the outstanding development and growth of the number of ATMs and bank branches along with other growth factors of banks in Vietnam, the bank's capital mobilisation sources have become more prosperous. Thereby leading to the capital adequacy ratio of banks at an acceptable level but still able to ensure stable cash flow and profits over the years.

GDP does not affect bank profitability since the coefficient of GDP is insignificant. Therefore, **Hypothesis H7** is rejected since no statistically significant relationship between GDP and bank profitability has been found. Our results are in line with the conclusions of the studies (Alper and Anbar, 2011; Samhan and Khatib, 2015), when no relationship between GDP and bank profitability was found. When GDP increases, it means that other industries and businesses are stepping up production and expanding their scale to meet the increasing social demand. Then, banks will have to keep interest rates stable to ensure a sustainable economy, so it will make it difficult for banks to achieve a breakthrough profit goal.

Inflation rate has a significant impact on bank profitability. This means that the paper accepted **Hypothesis H8**. It seems that banks in Vietnam can anticipate the inflation rate. Although banks recently endured an economic crisis in 2008, Vietnam's inflation level has climbed swiftly, yet this has not led banks to incur too many losses throughout the years. This association also corresponds with the findings of Vong & Chan (2009) and Guru et al. (2002) when assuming that there is a positive link between inflation rate and bank performance. This allows the banking sector in Vietnam more outstanding cash to engage in and combine lending operations.

## 5. CONCLUSION AND RECOMMENDATIONS

The central aim of the study is to examine whether financial inclusion from the accessibility aspect affects bank profitability (calculated by ROAE). The result indicates that the branch variable has a significantly negative impact on ROAE while the number of ATMs and POSs do not have a statistically significant relationship with ROAE. In terms of bank specific and macroeconomic variables, GDP and capital adequacy have insignificant impact on ROAE, however, inflation, bank size and liquidity have significant effect on bank profitability. The theoretical contributions of this research add to the existing knowledge and extends the understanding of financial inclusion, especially the accessibility aspect in the Vietnamese banking sector particularly and in emerging markets generally.

The findings of this study show important implications. Negative impact of the number of bank branches on profitability encourage banks to follow Circular No. 21/2013/TT-NHNN of the State Bank of Vietnam to limit of the number of branches and transaction offices. Higher intensity of financial inclusion than real participation in banking products and services will lead to higher inefficient cost, which then negatively affects bank profitability. Moreover, the negative result might be due to the lack of proper supervision so banks need to perform superior management practices in day-to-day operations while minimise input usage and weaknesses. Furthermore, concentrating only on the access dimension is not enough, banks should enhance all three aspects, especially the quality one, reduce fees and deploy incentive programs to stimulate use of formal financial services and products. According to Nguyen and Tran (2021), there are several backlogs in the enforcement of financial products and services in Vietnam. Besides, the positive correlation between liquidity and profitability demonstrates that each bank should maintain an appropriate liquidity level to balance risk and profitability preference. Liquidity will ensure the financial market's function, therefore, determine banking development.

Although this research paper has employed a handful of methodologies to offer robust results, limitations are undeniable. Very few research papers have been conducted on the influence of financial inclusion on

Vietnamese banks' profitability. This would result in some limitations in verifying the information and comparing between this research paper and other previous empirical studies in the same research field. Additionally, two other dimensions of financial inclusion (the usage and quality of financial inclusion) are not included in this paper because of the multicollinearity and deficient public information found in the Vietnamese banking sector. This lack of public information also resulted in limited observations as the study is focused on the panel of only 20 national banks in Vietnam during 10 years. Thus, future research studies should expand the observations and include all three dimensions of financial inclusion.

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## FINANCIAL LITERACY, DIGITAL LITERACY AND CUSTOMER CHOICES TOWARD DIGITAL BANKING SERVICES: AN EMPIRICAL STUDY IN VIETNAM

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**ABSTRACT:** *This paper aims to analyze the impact of financial literacy, digital literacy and customer experience on customer choices toward digital banking services in Vietnam. We collected data randomly from 601 participants aged from 18 to above 40 years old who have experienced digital banking services and we applied both qualitative methods and quantitative methods on the collected information. The findings show that financial literacy and digital literacy significantly affect customer use of fintech products, proving our hypotheses. Moreover, the effect of other variables of customer experience (the propensity of technology adoption, customer value for privacy, customer trust, and customer loyalty to internet services) is proven to be strongly positive. These results will support banks, households, and the government on a wide scale.*

*Keywords: Financial literacy, Digital literacy, Digital banking services, Customer choice, Vietnam.*

### 1. INTRODUCTION

The last decade has witnessed dramatic changes in the financial industry with fast digitalization. We are now encountering the growth of the financial system and the introduction of new digital banking products and services, which introduce customers to a wide range of choices to better manage their personal finances, including saving and investing, payments, borrowing, and risk management. Rapid developments in financial technology also emphasize the importance of financial and digital literacy in order to use innovative digital banking products and services (Morgan and Trinh, 2023).

Recent literature in the world has shown that the use of digital payment tools and platforms is associated with higher digital literacy, at all levels of financial literacy (Prete, 2022). The usage of digital payments in the data is related with the capacity to utilize digital technologies at all levels of financial literacy, whereas personal finance decisions are associated with financial literacy at all degrees of digital literacy. However, the study focuses only on digital payment tools, while there are many other types of financial and digital services and products offered by banks.

The first and only study carried out in Vietnam by Peter J. Morgan (2020) discovered a link between financial literacy and awareness and use of fintech products. However, the research totally ignored the impact of digital literacy. Unfortunately, we are not aware of any other articles that explore the influence of both financial literacy and digital literacy on choices toward digital banking services, or any other similar-related issue, anywhere in the globe, much alone in Vietnam.

In addition, Vietnam is considered as a country with potential for digital banking development due to the great demand of the market. When it comes to digital payments, Vietnamese consumers are shifting from saving to buying first and paying later. This is also a motivator for banks to make efforts in the

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digital transformation process to improve the customer experience, as well as for regulatory authorities to implement regulations to stimulate the growth of digital banking (Luru, 2019).

This paper attempts to fill this gap. By using collected data in Vietnam, our research would study the impact of financial and digital literacy on customer choices toward digital banking services. Because there was no research study on this topic before, our contribution would be a breakthrough in the financial area, and our findings may be utilized in the real world.

The remainder of the paper is organized as follows. The next chapter reviews the relevant literature. Chapter 3 informally describes the data set and introduces the research methodology. Chapter 4 discusses the results from the descriptive statistics performed by SPSS statistical software employing the most recent methodologies linked to Cronbach's Alpha, and Exploratory Factor Analysis (EFA). In the same chapter, AMOS software is used to analyze Structural equation modeling (SEM). Chapter 5 concludes, reviews recommendations for bankers, and provides the researcher's directions for conducting future research.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Financial literacy**

#### **2.1.1. Definition**

In the context of this research, it can be said that financial literacy is an indicator of how well a person understands the basics of finance, its institutions, and how well that person can utilize the services available.

#### **2.1.2. Theoretical background and hypotheses development**

Financial literacy has been viewed as a key tool for improving financial inclusion and individuals' long-run financial security, among both researchers and practitioners alike. The key component of financial literacy is defined as having awareness and knowledge about available products and services and how to access and use them given available tools and modes of delivery.

Financial literacy is described as having the “*information, skills, and beliefs that affect attitudes and behavior to improve the quality of decision making and financial management in order to reach prosperity*” by OJK (2017). People require financial knowledge to make wise choices regarding their finances. Siregar (2018) said that financial literacy affected the use of internet banking services, meanwhile, according to Nurjannah (2017) knowledge of banking products did not affect the use of e-banking products. Therefore, we state our hypothesis as:

*H1: Financial literacy has a significant effect on the use of digital banking services.*

### **2.2. Digital literacy**

#### **2.2.1. Definition**

In its most common form, digital literacy can be characterized as one's ability to access and utilize digital platforms and services. Global organizations and institutions such as OECD, UNESCO, and the European Commission have also been working to create frameworks for defining and measuring digital literacy across a variety of digital contexts and mediums (Lyons and Kass-Hanna, 2020; Lyons *et al.*, 2019).

#### **2.2.2. Theoretical background and hypotheses development**

Digital literacy, according to Gilster (Kemendikbud, 2017), is the capacity to use information obtained through a computer or other electronic device. The idea of digital literacy is crucial for comprehending technology, information, and communication, according to UNESCO (Kemendikbud, 2017). Likewise,

according to Vainio (Yudha and Isgiyarta, 2015) the ability to learn information technology affects a person's Computer Self Efficacy (CSE) in various situations.

The primary individual demands for utilizing the internet, according to Korgaonkar and Wolin (1999), are social escapism, information, interactive control, socialization, and economic reasons. It's interesting to note that, contrary to popular belief, a large proportion of people in industrialized nations believe they do not require the internet (The Guardian, 2003). The "prospective gratification" theory (LaRose *et al.*, 2001) could be able to explain such disinterest. The decision to use the internet is influenced by a person's habit strength, deficient self-regulation, and self-efficacy (Bandura, 1997).

Kang *et al.*, (2015) provided a theoretical framework including concepts such as digital literacy, information literacy, performance expectancy, effort expectancy, hedonic motivation and habit. This was a model that had been adapted based on the unified theory of acceptance and use of technology 2 (UTAUT2) model, designed on the intention to apply digital technology in education practice. The results of this study show that digital literacy has a positive relationship with intention to use digital technology in learning.

Hoang *et al.*, (2022) suggests that digital literacy not only has a direct impact on behavioral intention to use technology in learning but also provide mediation effects by positively influencing self-efficacy, performance expectancy, effort expectancy, social influence, habits, and hedonic motivation. From the background above, the second hypothesis of the research is as follows:

*H2. Digital literacy positively impacts the use of digital banking services.*

### **2.3. Customer choices toward digital banking services**

#### **2.3.1. Definition**

A customer journey is a whole interaction a consumer has with a company. The four-stage of a customer journey are initial consideration of alternatives, evaluation, choice, and consumption (Court *et al.*, 2009). Consumer choice, refers to the decisions that consumers make with regard to products and services (Collins English Dictionary, n.d.). According to Davis (1993), customer choice is the third stage after the consumers consider and evaluate the products or services they want.

#### **2.3.2. Theoretical background**

Existing research explored Internet banking resistance and its relation to individual values and determined that both functional and psychological obstacles evolved from service, channel, customer, and communication (Kuisma *et al.*, 2007). Therefore, several theories and models have been developed to explain the relationship of user beliefs, attitudes, and intentions. Some of these theories and models include the innovation diffusion theory (IDT), theory of reasoned action (TRA), the theory of planned behavior (TPB), the technology acceptance model (TAM), the social cognitive theory (SCT), the motivational model (MM) and the model of PC Utilization (PCUM). The IDT measures why consumers don't adopt new products and services by identifying five characteristics of innovations: relative advantage, compatibility with current products/methods, complexity, limited trialability, and communicability of features that may affect online banking acceptance (Fain and Roberts, 1997). The TRA has been extensively questioned since it primarily focuses on conscious behaviors that have been thoroughly considered before being performed, neglecting illogical decisions, habitual acts, and those subconsciously performed by customers (Al-Qeisi, 2009). The TPB is an extension of the TRA, which was employed to solve the deficiencies of TRA. Attitudes toward the conduct, subjective norms about engaging in the behavior, and judgments about whether the individual will be able to successfully engage in the target behavior all influence intent (Marangunić and Granic, 2015).

According to Davis (1989), TAM is developed based on consumers' adoption of computer systems, especially on their behavioral intention to use these systems, which comprises two beliefs called perceived ease of use and perceived usefulness. The SCT examines the social dissemination of new patterns of behavior in terms of the psychological elements that influence their acquisition and adoption, as well as the social networks that spread and maintain them (Bandura, 2001). The MM theorizes that extrinsic and intrinsic motivation are the main drivers of an individual's intention to perform a given behavior, and the intention to conduct a behavior is a construct that is intimately tied to the actual behavior (Venkatesh and Speier, 1999). Thompson *et al.* (1991) developed a model to predict PCUM which included six factors of technology acceptance: job fit, complexity, long-term consequences, affect toward use, the social factor and the facilitating conditions.

The review and integration of these seven theories and models above developed the unified theory of acceptance and use of technology (UTAUT). The UTAUT indicates that four constructs—performance expectancy, effort expectancy, social influence, and facilitating conditions—are key drivers of behavioral intention and, ultimately, behavior (Venkatesh *et al.*, 2003). The UTAUT theory is used in the research of Salem *et al.* (2019), and then becoming the supporting theory of this study.

According to Salem *et al.* (2019), there are six factors including the propensity of technology adoption, customer value for privacy, customer trust, customer value for online personalization, technology and leadership, and customer loyalty to internet services affecting Palestinian customers' use of online banking services. However, when applied in the research environment of Vietnam, these six factors are changed and our research paper will focus on four exogenous latent indicators such as the propensity of technology adoption, customer value for privacy, customer trust, and customer loyalty to internet services.

### **2.3.3. Hypotheses development**

#### *2.3.3.1. The propensity of technology adoption*

Technical innovations that enhance performance in a specific context are typically influenced by customer predisposition to adopt them according to Chandio *et al.*, 2017. In 2020, a study by Santini *et al.* found a higher association between the TAM aspects and opinions regarding adopting electronic banking systems among Internet banking users. Similarly, the empirical study in Vietnam indicated a favorable association between client happiness and banks' capacity to stay on the cutting edge of technology (Wang and Pho, 2009). Therefore, we hypothesize that:

*H3. Customers' technology adoption propensity affects the use of digital banking services.*

#### *2.3.3.2. Customers' concern for privacy*

Most customers are concerned about their privacy when using online services (Sreejesh *et al.*, 2016). Chellappa (2001) offers scales for measuring consumer privacy perception. It was based on the recommendations of Smith *et al.* (1996) and the FTC (1996). These scales are intended to assess the subjective beliefs of customers. Previous study in Vietnam by Nguyen and Nguyen (2017) also supports that perceived risk was modeled and divided into privacy risk, which has a negative impact on online banking intention. Therefore, we hypothesize the following:

*H4. Customers' concern for privacy affects the use of digital banking services.*

#### *2.3.3.3. E-trust*

Trust is often conceived of as a relationship between one agent (the trustor) and another agent or object (the trustee). The trustors' ideas about the trustee's competence and the circumstances in which

the relationship happens are believed to underpin the relationship. This is a broadening of Gambetta’s (1998) concept of trust. E-trust arises when direct and physical contact is not feasible, moral and social influences are perceived differently, and interactions are mediated by digital technology. More importantly, the empirical study in Vietnam by Nguyen and Khoa (2019) indicated online trust has a significant role on customer electronic loyalty towards online business. Considering the recently identified relationship between e-trust and the usage of digital banking services, we present the following hypothesis:

*H5. E-trust affects the use of digital banking services.*

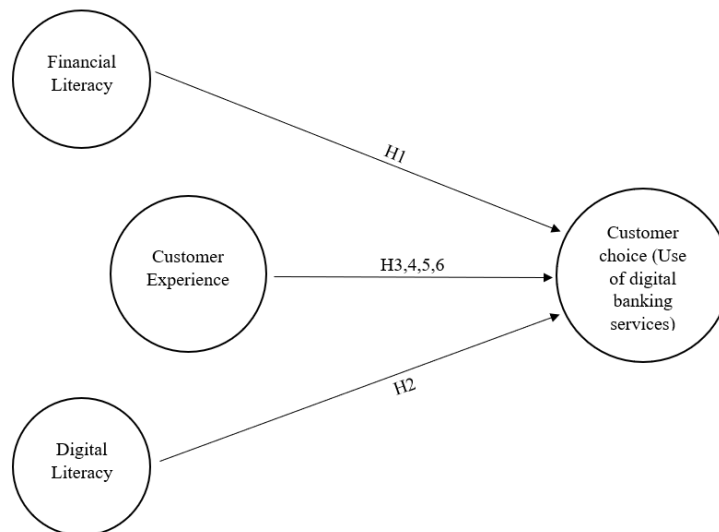
2.3.3.4. E-loyalty

E-loyalty is described by Flavián *et al.* (2006) as a preference that causes the website to be the most frequented and is selected for the purchase of a specific product category. In this study, e-loyalty is defined as customers’ perceived loyalty to digital services and their propensity to use these services again. In addition, Chen and Yang (2014), and Kassim and Abdullah (2008) claimed that providing services that are easily navigable and accessible allows online clients to create long-term connections with customers. In Vietnam, the study by Giao *et al.* (2020) showed a positive effect of website quality on e-loyalty regarding online shopping. As a result, loyalty might be viewed as an attempt to interact with consumers. This study proposes the following hypothesis:

*H6. E-loyalty affects the use of digital banking services.*

2.4. Expected Model

Based on the aforementioned theoretical basis, the expected model is built.



**Note:** Customer Experience includes four sub-variables such as technology propensity, customer’s concern for privacy, e-trust, and e-loyalty.

Figure 2.1. Expected model

3. RESEARCH METHODOLOGY AND DATA COLLECTION

3.1. Research methodology

The sample subjects were customers of commercial banks in Vietnam. The study’s main methodology was survey research. We gathered the questionnaires used in the previous studies (included in Table 3.1.)

to develop our own one. We translated the original questions into Vietnamese, and then they were reviewed by two separate and independent Vietnamese native speakers. The English version of the questionnaire was pilot tested for accuracy and content validity.

After that, the first version of the questionnaire was used to test with a small group of 20 people, then we collected the sheets back and analyzed the data to see whether or not these questions were suitable for the environment of Vietnam. As a result, the context of the financial literacy question set was changed to fit with Vietnamese bank customers and two questions of the digital literacy set were moved out because they have something similar to the other questions in the same set.

The results showed that when running the exploratory factor analysis, six sub-variables of customer choice only explained four dimensions of this big variable. Besides, 8 questions in the question set seemed to contribute weak exploratory power to the overall variable with loading factors all smaller than 0.5. Therefore, these 8 questions were canceled out and the remaining 24 questions were again divided into 4 categories which are e-loyalty, e-trust, customer concern for privacy, and technology propensity, respectively. The sub-variable “use of digital banking services” was used to measure the dependent variable, therefore, it remained the same. After that, the second version of the questionnaire was widely used. We used both printed and online versions when collecting samples. After three months of collecting data, we finally had 601 samples and decided to end this step here.

After classifying text data into categories giving each category a numerical code, the IBM SPSS Statistics software was used to test the validity and reliability of the questionnaire, ensuring that the questions in a dimension measure the same component and all the questions are in good correlation with each other. Afterward, the relationship between financial literacy, digital literacy and customer choice are tested by the SEM model using AMOS software. From the results generated, we can conclude whether or not the hypotheses are supported.

### 3.2. Research framework

The research design is described step by step in Figure 3.1.

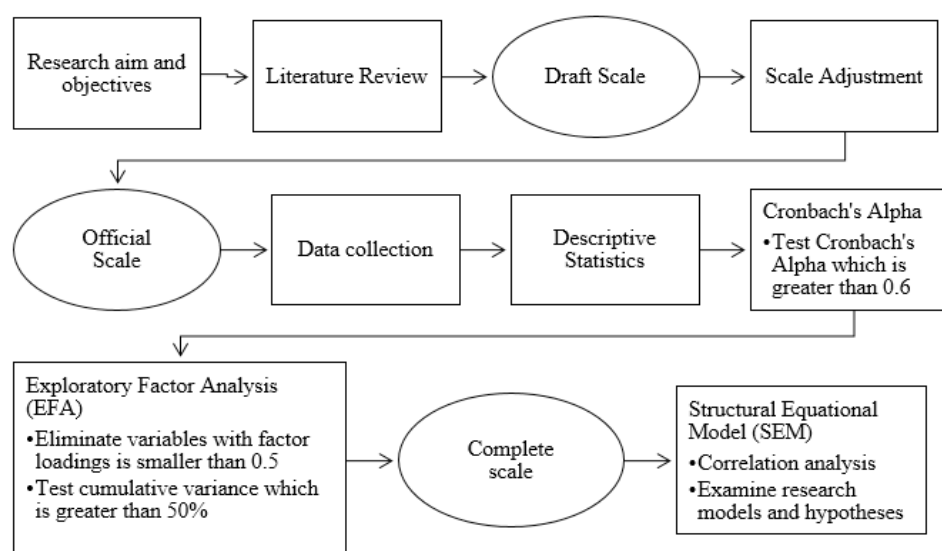


Figure 3.1. Research design

### 3.3. Measurement of variables

#### 3.3.1. Financial literacy

The measurement of financial literacy is summarized in Table 3.2.

**Table 3.1. Measurement of financial literacy**

Item	Content	Measure	Reference
FL1	Simple interest calculation	With one correct answer get one point, otherwise get zero point.	Author's own question
FL2	Compound interest calculation		OECD (2016)
FL3	Understanding the consequences of inflation		Lusardi and Mitchell (2011)
FL4	Benefits of risk diversification		Andreou and Anyfantaki (2020)
FL5	Understanding the composition of the annual percentage rate (APR)		

As having mentioned above, the financial literacy variable is calculated based on a set of 5 common questions. These consist of (i) one recommended question as per the OECD (2016) survey, and similar to that of Lusardi and Mitchell (2011), that relates to the concept of “compound interest calculation” (FL2); (ii) one questions from Lusardi and Mitchell (2011) that relate to the concepts of “understanding the consequences of inflation” (FL3) and “benefits of risk diversification” (FL4); (iii) one question from Andreou and Anyfantaki (2020) that relate to the concepts of “understanding the composition of the annual percentage rate” (FL5) and (iv) the authors’ own question that relate to “simple interest calculation” (FL1).

With one correct answer, the respondents get one point and get zero for a wrong answer or if they cannot answer the question properly. After marking each individual question, we calculate the total point for each respondent to measure their knowledge level of finance. A person who is regarded as having good understanding in finance needs to get at least 4 out of 5 points. Besides, the first 3 questions show the respondents’ understanding in daily financial activities, while the following 2 questions require the respondents to have knowledge about investment and banking.

#### 3.3.2. Digital literacy

**Table 3.2. Measurement of digital literacy**

Item	Content	Measure	Reference
DL1	Digital technology access and usage	For one device used, get one point.	Kass-Hana <i>et al.</i> (2021); Lyons and Fontes (2021)
DL2	Mobile phone proficiency	<ul style="list-style-type: none"> <li>- Choose one of the following options get one point: Gửi và nhận cuộc gọi, Gửi và nhận tin nhắn văn bản, Gửi và nhận hình ảnh</li> <li>- Choose one of the following options get two points: Lướt web trên thiết bị di động, Tải các phần mềm, Tham gia vào cuộc gọi video, Nghe nhạc, Quay video</li> <li>-Choose one of the following options get three points: Tải nhạc, video, hoặc game, Tìm đường và các gợi ý ăn uống, giải trí, sinh hoạt,..</li> <li>- Choose the following option and get 4 points: Thực hiện các giao dịch tài chính</li> </ul>	
DL3	Mobile money and other digital financial proficiencies	Answer “Yes” get one point, otherwise get zero point.	
DL4	Use of digital banking services	For one service used, get one point.	Author's own question

A set of 4 questions are put into the questionnaire to measure the digital literacy of respondents. The questions go from the very first level which is basic knowledge and skills to decision-making level, which reflects the ability to make appropriate digital decisions, reflective of attitudes and behaviors. The digital literacy framework is based on the results of Lyons and Kass-Hana (2021) and is already stated in Section 3.1. As shown in Table 3.3, with one digital device used, the respondents get one point. To measure digital proficiency, we divide the digital literacy into five dimensions namely basic knowledge and skills, awareness, practical know-how, decision-making, and self-protection, according to the study results of Lyons and Kass-Hana (2021). The answer options are divided into these five dimensions and the mark for each dimension increases in the same order with that of dimension. Then, the total score is calculated to measure the popularity of respondents with digital products and their ability to use digital services in daily life and in bank-related decisions.

### 3.3.3. Customer choices

Table 3.4 below summarizes the measurement of customer choice.

**Table 3.3. Measurement of customer choice**

Item	Indicator	Measure	Reference
TP	Technology propensity	Based on Likert-5 scale	Salem <i>et al.</i> (2019)
CCP	Customers' concern for privacy		
ET	E-trust		
EL	E-loyalty		
UDBS	Use of digital banking services		

Beside financial literacy and digital literacy, the customer experience toward digital banking services is measured through 4 dimensions, which are e-loyalty, e-trust, customer concern for privacy, and technology propensity. Table 3.1 above lists the questions in detail. The Likert 5 scale is used to measure the agreement of respondents with the above 4 dimensions, ranging from 1 (totally disagree) to 5 (totally agree) and the average score is calculated for each dimension. Besides, a set of 3 questions are used to calculate the choice of digital banking services, which is the dependent variable of this study.

## 3.4. Assessment model

### 3.4.1. Measurement model

#### 3.4.1.1. Cronbach's alpha

Alpha was developed by Lee Cronbach in 1951 to provide a measure of the internal consistency of a test or scale; it is expressed as a number between 0 and 1 (Cronbach, 1951). There are different reports about the acceptable values of alpha, ranging from 0.70 to 0.95 (Nunnally and Bernstein, 1994; Bland and Altman, 1997; DeVellis, 2003). According to Streiner (2003), a maximum alpha value of 0.90 has been recommended. A high value of alpha ( $> 0.90$ ) may suggest redundancies and show that the test length should be shortened (Tavakol and Dennick, 2011).

#### 3.4.1.2. Exploratory factor analysis (EFA)

According to Stapleton (1997), the purpose of exploratory factor analysis is to identify the factor structure or model for a set of variables. This often involves determining how many factors exist, as well as the pattern of the factor loadings (Stapleton, 1997). In other words, the EFA will test whether or not the sub-variables assumed to belong to one dimension are measuring the same component, and whether the sub-variables of this component are different from that of the other components.

The Kaiser-Meyer-Olkin (KMO) and Bartlett's test measure the strength of the relationship among variables. For the value of KMO, Kaiser (1974) recommends 0.5 as minimum (barely accepted), values between 0.7-0.8 are acceptable, and values above 0.9 are superb. For Bartlett's test, we want to reject the null hypothesis that the correlation matrix is an identity matrix at 95% confidence level. Therefore, the significance level of the Bartlett's test needs to be smaller than 0.05.

### **3.4.2. Structural equation model (SEM)**

SEM is a collection of statistical techniques that allow a set of relations between one or more independent variables (IVs), either continuous or discrete, and one or more dependent variables (DVs), either continuous or discrete, to be examined. SEM is also referred to as causal modeling, causal analysis, simultaneous equation modeling, analysis of covariance structures, path analysis, or CFA. The latter two are actually special types of SEM (Ullman, 2006).

This paper uses prior research and literature to form hypotheses and variables are tested using Cronbach's alpha and EFA. The latent variables include demography, measured by observed variables such as age, location, income, and gender; customer experience, measured by variables e-loyalty, e-trust, and more. These will be tested for the relationship with customer choice, itself a latent variable measured using Likert scale questions provided. More notable, however, is that in this research, observed variables of financial literacy, digital literacy, work and academic background are also directly tested for the relationship with the latent variable of customer choice. In the diagram created in the SPSS AMOS program, latent variables are conventionally denoted as ovals, observed variables as rectangles, and error terms as circles.

Model estimates for path coefficients and their standard errors are generated under the implicit assumption that the model fit is very good. If the model fit is very close, then the estimates and standard errors may be taken seriously, and individual significance tests on parameters (path coefficients, variances, and covariances) may be performed. There would be a test of the null hypothesis that there is no covariance between the two latent variables. This parameter estimate (covariance) is then evaluated with a z test (the parameter estimate divided by the estimated standard error). The null hypothesis is the same as in regression, the path coefficient equals zero. If the path coefficient is significantly larger than zero, statistical support exists for the hypothesized predictive relationship (Ullman, 2006).

## **4. RESEARCH RESULTS AND DISCUSSION**

### **4.1. Descriptive statistics**

Of the 1,000 questionnaires distributed among people who are living and working in different locations in Vietnam, 653 were returned, showing a response rate of 65.3 percent. Details of the participants show that a higher proportion of the sample was female, the majority of whom were between 31 and 40 years of age.

#### *Financial literacy*

The breakdown of the responses to financial literacy questions shows that a large number of the respondents (389 respondents or 64.73% of the entire sample) answered correctly to the question on the benefits of risk diversification (FL4) and the simple interest question (FL1) (383 respondents or 63.73% of the entire sample). This evidence provides the first indication of reliability in our instrument. Accordingly, the number of individuals who answered correctly to F1-F4 is quite close.

In this study, following Andreou and Philip, 2018, a proficiency in financial knowledge is attributed to those answering at least four out of five financial knowledge questions correctly.



### *Digital literacy*

Table 4.5 illustrates that most participants are aware of the available digital applications and have access to digital banking. However, their basic digital access and usage as well as awareness of available digital applications normally range from a low level to an average.

Considering this result, it can be mentioned that generally, the respondents have good knowledge of digital literacy and positive attitude towards digital banking service. The findings are in line with some previous empirical studies in different contexts (Nguyen and Habók, 2022, Hoang *et al.*, 2022). Rizal *et al.* (2021) stated that in general, digital literacy of males was better than that of females. However, in this study, we saw opposite results.

### *Customer experience*

The questionnaire results for customer experience reveals that the majority of the respondents agree on the 4 dimensions of customer experience toward digital banking services, including technology propensity, concern for privacy, e-trust and e-loyalty, regardless of their demography and background information. The study by Laforet and Li (2005) revealed evidence in favor of this.

The research results are also proved to be in line with the previous studies (Page and Luding, 2003). Stewart (2003) also stated that once clients have enough trust in a website or app, they find it to be more valuable. According to Fortes and Rita (2016); Glover and Benbasat (2010); Nguyen *et al.*, (2016) the risk of losing personal information or transactions creates a barrier to electronic services.

## **4.2. Testing indicators using Cronbach's alpha**

Cronbach's Alpha of the financial literacy index is 0.661 which is considered an acceptable degree of reliability. Furthermore, the digital literacy index has a Cronbach's Alpha value of 0.741 which means that digital literacy has a reasonable level of reliability. After all, Cronbach's Alpha of the customer choice index is acceptable at the number of 0.680.

Regarding the 4 dimensions of customer experience, e-loyalty (CCEL) has the highest Cronbach's alpha (0.911) which illustrates that the measurements for CCEL are the most reliable. Though Cronbach's alpha of propensity of technology is 0.513, it is appropriate because the number of these items is less than 10. Also, Cronbach's alpha of customers' concern for privacy and e-trust are both high values (0.842 and 0.845 respectively) indicating that the response values for these two dimensions across a set of questions are highly correlated.

## **4.3. Testing indicators using exploratory factor analysis**

In this study, the EFA is applied to test for three big variables: financial literacy, digital literacy and customer choice. In the case of financial literacy, the five sub-variables are moving into two components.

For financial literacy, the loading factors are all bigger than 0.5 with the total initial eigenvalues bigger than 1 (1.055) and the cumulative exceeds 50% (60.597%). The KMO and Barlett's test result of digital literacy shows that the data is adequate as the KMO measure equals 0.691 bigger than 0.5 and the Barlett's test significance equals 0.000 smaller than 0.05. This result is also true for the digital literacy.

For the customer choice, with the KMO measure of sampling adequacy bigger than 0.5 (0.938) and Barlett's test of significance smaller than 0.05 (0.000), the data collected to measure customer choice is proven to be adequate. With the loading factor bigger than 0.5, 21 sub-variables are divided into 4 components to measure 4 aforementioned dimensions, which are e-loyalty, customer concern for privacy, e-trust, and technology propensity, respectively.

**4.4. Structural model assessment**

This research used Structural Equation Modeling (SEM) to further examine the impact of various factors to customer choice toward digital banking services. Table 4.9 explains the variables used in the model.

**Table 4.9. Components of model**

Demography	Age
	Gender
	Location
	Salary
Working field/ Education major (FIN)	
Financial literacy (FL)	
Digital literacy (DL)	
Customer experience	E-Loyalty (EL)
	E-trust (ET)
	Customer Concern for Privacy (CCP)
	Technology Propensity (TP)

The research model will now be the “Customer choice” factor that will be reflected directly by three components: (1) Demography (4 items), (2) Background (3 items), (3) Customer experience (4 items).

**Table 4.10. Standardized coefficients**

	<b>Coefficients</b>	<b>p-value</b>
Demography	0.007	0.628
Financial literacy (FLtot)	0.31	***
Digital literacy (DLavg)	0.35	***
Working field	0.04	0.291
Customer experience	0.62	***

Financial literacy also has a positive relationship with customer decision to use digital banking services, with the standardized coefficient of 0.31. In other words, a one-standard deviation increase in the financial literacy score is associated with a 31% increase in the probability of the adoption of digital banking services. Individuals with a high level of financial education may have basic understanding and knowledge of the functionality of banks’ services and products, therefore, they would tend to use fintech products more than people with lower level of financial literacy. This result is quite consistent with the previous result of Morgan and Trinh in 2023. The study stated that there is a relationship between financial literacy and the adoption of fintech services in Vietnam.

On the other hand, our study results show a more significant relationship between financial background and customer choice toward digital banking services. While the previous result shows a small effect of financial education on customer adoption, only around 4%, our research result shows a very strong correlation with beta of 31%, nearly 10 times higher than expected. The spread may be explained by the difference in the digital banking services and fintech products. Digital banking services is a widely defined term, while fintech is just a subset of this term. In addition, during the Covid-19, digital banking products became more and more popular than ever as it emerged as an alternative for traditional banking services. Consequently, people who have financial literacy would prepare themselves with updated financial information, which means they would have higher probability of awareness of new financial products and use them for convenience during the Covid lockdown.

Digital literacy has the second highest influence on the customer choice of use with coefficients of 0.35. A standard deviation increase in digital literacy would increase the likelihood of using digital banking services by 35%. A previous study of Anna Lo Prete (2022) also indicated that digital literacy is associated

with higher likelihood of using digital banking services.

Customer experience has the largest impact on customer decisions. It has the highest coefficient of 0.62. The estimate is quite similar to the research of Salem *et al.* (2018), which present a positive relationship of customers' experience (including customer's propensity of technology adoption, customer's value for online personalization, customer's concern for privacy, e-trust, technology and leadership and e-loyalty) and their use of online banking services. This is understandable, as people always want to have the best experience for every service that they pay for.

In addition, our research findings show that the working field has the coefficient of 0.04, while the coefficient of demography is 0.07. However, both of them are not statistically significant with p-value greater than 0.1. Thus, we can not give any further conclusion.

## **5. CONCLUSIONS AND RECOMMENDATIONS**

### **5.1. Conclusions**

This paper presented an integrated understanding of the link among customers' decision to use digital banking services and their financial and digital background in Vietnam. More than 600 samples were collected from the population aged 18 to over 40 in Vietnam.

Our research findings show that customers' financial and digital backgrounds would significantly affect customer use of fintech products, proving our hypotheses. This result is similar to the findings of Morgan (2023) and Servon (2008), which prove the relationship between fintech and financial literacy. On the other hand, there have not been any papers studying the link between digital background and customer use of digital products, so our result can be considered a breakthrough point that practitioners and researchers should take into account.

Nevertheless, we can see that the impacts of the variables on customers' choices are not strong, even when they have a positive impact on customer choice. On the other hand, the customer experience has a strong positive impact on the way customers choose to use digital products of banks. We can also conclude from the model results that customers' demographic such as age, gender, etc. has no impact on their choice.

### **5.2. Recommendation**

While the primary goal of this research was to investigate the link between the usage of fintech products and customers' digital and financial literacy, it also has broad implications for the whole financial services sector. A positive relationship between customer decision to use digital banking services and financial and digital background indicates that clients who lack financial and digital skills may struggle the most with moving to digital platforms, executing basic digital transactions, and selecting and assessing among a more sophisticated collection of digital financial services. These clients should be given extra attention by financial institutions, who should provide information and training on how to use new digitalized platforms (Lyons and Kass-Hanna, 2021).

Increasing the financial literacy, as well as the digital literacy of Vietnamese people would be necessary. The government should encourage schools and educational institutions to provide fundamental technological and financial skills to children at a young age. When educating students about finance and digitization, practice is also essential. Schools should develop ways to make financial and digital information as practical and straightforward as feasible for their students.

On the other hand, being able to use digital banking services would probably benefit households in certain ways. Thus, each individual needs to realize the crucial role of financial technology products, and prepare themselves and be open-minded to adopt new technology in the financial and banking sectors

In addition, customer experience is regarded as one of the most essential aspects influencing client decisions. When leveraging their digital goods, financial institutions should be mindful of the client experience. Providing clients with valuable and high-quality products may not only entice them to use online banking solutions, but it may also increase their loyalty and frequency of usage toward the financial institutions.

### 5.3. Limitations and Future Research Directions

This study, like any others, has several limitations. Most importantly, the amount of responses is just over 600, which is still more than enough to ensure an acceptable 5% margin of error (Saunders et al, 2019), yet still leave significant room for improvement. In addition to expanding the size of the respondents pool, an increase in scope will also be needed in a future research to better understand the customers' choices in Vietnam, most notably, rural customers. While currently there is nothing in particular being biased against rural customers in this research, the data collection method of questionnaire and its distribution meant that the respondents pool inherently skewed towards more "accessible" respondents, those either with adequate internet access or within physical reach of the research team. In other words, it takes special effort and focus to get a truly balanced data pool and to better represent the less visible rural customers.

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## ASSESSING THE PRICE AND OUTPUT EFFECTS OF MONETARY POLICY IN VIETNAM: EVIDENCE FROM A VAR ANALYSIS FROM 2018-2022

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**ABSTRACT:** *This study uses the monthly data of fundamental macro indicators to conduct vector-autoregression analysis (VAR) and examine the impacts of monetary policy on the Vietnamese economy from 2018 to 2022. We concentrate on the period in which the COVID-19 pandemic outbreaks and the Vietnamese government has controlled the epidemic while preserving economic expansion, ensuring stable and streamlined money market operations. Our study found that tighter monetary policy helps stabilize prices, while an expansionary monetary policy can increase industrial production but also contribute to inflationary pressures from credit expansion.*

**Keywords:** *monetary policy, macroeconomic, Covid-19, vector-autoregressive analysis (VAR).*

### 1. INTRODUCTION

Monetary policy in Vietnam during 2018-2022 underwent significant changes, including multiple interest rate cuts by the State Bank of Vietnam (SBV) to facilitate credit institutions' access to capital at lower costs and support production and business activities. However, questions remain about the impact on price levels and production output. This study uses Vector Autoregression (VAR) analysis on monthly macroeconomic indicators to assess the effects of monetary policy on prices and production in Vietnam. The research aims to provide insights for policymakers, investors, and business leaders, especially given recent financial market turbulence and the COVID-19 pandemic's impact.

The study contributes by empirically evaluating the effects of contractionary and expansionary monetary policies on price stabilization and industrial production in Vietnam, aiding policy decisions during crisis periods. It serves as a guide for policymakers in formulating effective financial strategies for balanced economic expansion and inflation management.

The research is structured with Section 2 discussing international and domestic studies during the COVID-19 pandemic, identifying research gaps and outlining Vietnam's monetary policy framework. Section 3 explains data sources and the VAR model used for analysis. Section 4 presents the results analyzing the impact of monetary policy on output and prices, impulse response functions, and variance decomposition analysis. Section 5 concludes with essential findings supporting the need for country-specific monetary policy in Vietnam and provides recommendations for policymakers to achieve a balance between output and price objectives..

### 2. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

#### 2.1. Existing study results

Monetary policy's impact varies across countries and is influenced by factors such as the type, timing, and persistence of shocks. Developing nations with underdeveloped financial systems may face challenges

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in transmitting monetary policy (Walsh, 2003; Grilli & Roubini, 1996). Studies suggest a positive relationship between increased broad money and inflation, but the effectiveness of monetary policy on industrial production and price levels may vary (Mojon & Peersman, 2001).

In Vietnam, empirical research on the effectiveness of monetary policy is limited. Some studies have shown limited effectiveness in influencing industrial production and price levels through certain transmission channels, but a positive effect through the cost channel has been observed (Hung & Pfau, 2009; Vo & Nguyen, 2017). Other research highlights the vulnerability of the Vietnamese economy to external disruptions (Anwar & Nguyen, 2018).

While several studies have explored the effects of monetary policy in Vietnam using VAR models, some did not align their variables or model identification with the country's practical implementation of monetary policy (Hai & Minh Trang, 2015; Phan, 2014; Nguyen, 2014a; Pham Anh, 2016). Previous assessments of monetary policy mechanisms in Vietnam have been considered preliminary research with limited time coverage (Camen, 2006; IMF, 2003, 2006).

## **2.2. Research gap**

Existing studies on the impact of monetary policy in Vietnam are limited and focus on specific transmission channels or inflation determinants. More comprehensive and up-to-date research is needed to examine the direct effects of monetary policy on industrial production and prices. The current studies have limitations in terms of variables, analysis period, and structural assumptions. Robust and flexible models that reflect the Central Bank's policy design are necessary, considering potential data distortions from external shocks and economic changes. There is a lack of academic papers specifically measuring the price and output effects of monetary policy in Vietnam from 2018 to 2022.

## **2.3. The monetary policy environment in Vietnam**

Since the late 1980s, Vietnam has undergone significant financial sector reforms, transitioning from a monobank to a multibank system. The State Bank of Vietnam (SBV) has played a crucial role in implementing monetary policy and ensuring the stability of the banking and credit institutions. The primary goal of monetary policy, as stated in the SBV Law, is to maintain price stability.

In response to the COVID-19 pandemic, the Vietnamese government and the SBV implemented various measures to support the economy. These included financial support packages, tax measures, and interest rate reductions. The SBV synchronized monetary, credit, and liquidity measures to maintain market stability and promote economic growth.

To facilitate access to bank loans and support priority sectors, the SBV directed credit institutions to increase credit effectively and efficiently. As of June 15, 2021, outstanding credit in the economy had increased compared to the previous year.

Circular 03/2021/TT-NHNN, issued by the SBV, provided guidelines for rescheduling debts, waiving or reducing bank interest and fees, and maintaining debt categories to assist clients affected by the pandemic. These measures aimed to alleviate the financial burdens faced by businesses and individuals.

Overall, the SBV has been proactive in implementing monetary policy and providing support to mitigate the adverse impacts of the COVID-19 pandemic on the Vietnamese economy (The State Bank of Vietnam, 2010; Mr. Pham Thanh Ha, Director General of the SBV Monetary Policy Department; Mr. Nguyen Tuan Anh, Director General of the SBV Department of Credit for Economic Sectors; Circular No. 03/2021/TT-NHNN).



## 2.4. Hypothesis development

Monetary policy's impact on economic growth varies across countries due to different factors. In Vietnam, monetary policy significantly influences output and prices, as shown in studies like Bui and Nguyen (2020). This supports the crucial role of monetary policy in driving economic growth, aligned with findings by other researchers (Bernanke & Gertler, 1995; Mishra et al., 2012; Österholm, 2005; Nguyen et al., 2016; Bui and Nguyen, 2020).

***H1. Monetary policy significantly impacts both output and prices in Vietnam and acts as a driver for the Vietnamese economy.***

Impulse response functions (IRFs) show that unexpected tightening of monetary policy leads to a temporary decline in output and delayed price increases in various countries, including the US (Christiano et al., 1999), the euro area (Peersman & Smets, 2001), and developing countries like Vietnam (Bui & Nguyen, 2020). Studies in Canada and the euro area indicate that prices respond with persistence due to nominal rigidities in prices and wages (Cushman & Zha, 1997; Galí et al., 2007).

Overall, consistent findings across different countries support the hypothesis that monetary policy has a substantial influence on the economy (Christiano et al., 1999; Peersman & Smets, 2001; Bui & Nguyen, 2020; Cushman & Zha, 1997; Galí et al., 2007).

***H2. The impulse response functions indicate a significant positive response of output and prices to monetary policy shocks, although the response tends to be more persistent for prices.***

Research on the causal relationships between money supply, output, and prices in Vietnam has shown mixed results. Some studies found bi-directional causality between money supply and prices, while others suggest uni-directional causality from money supply to output. These findings emphasize the significant impact of monetary policy on output and prices in the short run in Vietnam, as observed in Bui and Nguyen's study (2020) with contractionary policy effects.

***H3. There is bi-directional causality between money supply and prices, and uni-directional causality from money supply to output, indicating that monetary policy can affect both output and prices in the short run.***

Monetary policy impacts prices and output through interest and exchange rate channels, supported by research (Bernanke & Blinder, 1992; Christiano et al., 1996; Eichenbaum & Evans, 1995; Gali & Monacelli, 2005). In Vietnam, studies confirm the relevance of these channels (Nguyen, Nguyen, & Tran, 2018; Pham, 2016).

***H4. The effects of monetary policy on prices and output are transmitted through both the interest rate and the exchange rate channels.***

## 3. DATA AND METHODOLOGY

### 3.1. Model specification

This study uses the VAR model to analyze Vietnam's monetary policy transmission mechanism, considering both domestic and foreign variables. The research is based on established practices and focuses on the Vietnamese economy in 2018.

### 3.2. Variable measurement

#### ***Domestic Block:***

Key variables in analyzing the effects of monetary policy in Vietnam include the Consumer Price Index (CPI) for price changes and the Industrial Production Index (IPI) for industrial output. Broad money (M2) and interest rates are crucial indicators of the money supply and its influence on savings and

investments. Total credit and exchange rates also play significant roles in monetary policy’s impact on Vietnam’s economy.

**Foreign Block:**

Vietnam’s integration into the world economy exposes it to external shocks, making domestic prices and output growth more vulnerable (Anwar & Nguyen, 2018). Changes in oil prices, for example, can impact production costs and consumer prices (Trang et al., 2017). Considering that oil is a significant component of Vietnam’s exports, the world oil price is included as an exogenous variable.

The pass-through of policy rates to bank lending rates is crucial to monetary policy effectiveness. In the case of Vietnam, using data from neighbouring China is more appropriate than embedding the U.S Federal Fund Rate due to China’s economic significance and its status as Vietnam’s largest trading partner (Matemilola et al., 2015; General Department of Customs, 2023).

**Table 1. Variable selection**

Variable	Initial	Unit
Domestic block		
Industrial Production Index	IPI	Index
Consumer Price Index	CPI	Index
Broad money growth rate	M2	%
Central bank policy rate	Inte	%
Total domestic credit	Cred	Billion VND
Nominal exchange rate USD/VND change	EXC	%
Foreign block		
World oil price	OIL	U.S dollars per barrel
Chinese lending rate	Chirate	%

*Source: Authors’ compilation*

**3.3. Data analysis**

The first step was to examine the properties of the data to identify any seasonality. The time frame covered January 2018 to January 2022, and the data was plotted to assess seasonality. The industrial production index displayed clear seasonal patterns, while broad money, credit, and exchange rates exhibited partial seasonal patterns. A regression analysis was then conducted for each variable using seasonal dummy variables and a yearly time trend to detect seasonality.

To identify unanticipated shifts in time series that could lead to unreliable estimates, structural break tests were performed for industrial production and the price level, given the primary focus on output and price level responses to monetary policy shocks. The dependence of industrial production and price levels on all other included variables was estimated using OLS, followed by a test for unknown break dates. The analysis indicated a structural break in the time series, and two dummy variables were incorporated in the VAR models at the levels to account for them.

To examine the stationarity of all variables, unit root tests were conducted using the Augmented Dickey-Fuller statistic (ADF). A structural form of VAR was then employed to isolate purely exogenous policy shocks and measure their impact on the variables included in the VAR model, supported by Granger causality tests. Through conducting Granger causality tests using a VAR model with two lags at the levels,

we observed that economic target variables, specifically IPI and CPI, have a causal influence on policy variables such as M2, Inte, and EXC. Furthermore, our analysis revealed that M2 has a significant Granger-causal effect on Inte and EXC at a 10% significance level, and on Cred at a 1% significance level. Inte, on the other hand, Granger-causes Cred at a 1% significance level. Notably, EXC is influenced by almost all variables examined, including IPI, CPI, M2, and Cred.

**Table 2. Summary statistics**

Variable	Obs	Mean	Std.Dev	Min	Max
Domestic block					
IPI	60	106.25	13.06	98.46	145.09
CPI	60	100.24	0.49	98.46	101.52
M2	60	0.00	0.01	-0.01	0.04
Cred	60	0.00	0.01	-0.04	0.04
Inte	60	0.03	0.01	0.02	0.04
EXC	60	0.00	0.011	-0.04	0.04
Foreign block					
OIL	60	69.17	19.65	26.35	115.60
Chirate	60	0.04	0.00	0.036	0.04

*Source: Authors' compilation*

## 4. RESULTS AND DISCUSSION

### 4.1. Seasonality

We examine the characteristics of the data to identify any seasonality, covering the period from January 2018 to January 2022. To assess seasonality, we initially plotted the data, which revealed clear seasonal patterns in the industrial production index, while broad money, credit, and exchange rates exhibited partial seasonal patterns. No seasonal patterns were observed for the policy rate, world oil price, and Chinese lending rate. Subsequently, we detected seasonality by performing regression analysis for each variable using seasonal dummy variables and a yearly time trend. (see **Equation (1)**).

$$Y_t = c_0 + qYear_t + \varepsilon_t; (1)$$

where  $Y_t$  is the value of any variable Y at time t;  $c_0$  is the constant (corresponding to the mean value observed for month 12),  $q$  is the coefficient of the linear (yearly) time trend, and  $\varepsilon_t$  is the error term. The coefficients for the seasonal dummy variables are statistically significant for industrial production, broad money, total credit, and the exchange rate. As a third step, we generated seasonally-adjusted values using the X-12 ARIMA/TRAMO procedures (Franses, Paap, and Fok 2005). An alternative approach to addressing seasonality involves incorporating a full set of monthly dummy variables in the VAR models. The estimated impulse response functions, when employing seasonal dummy variables, closely resemble those obtained with seasonally-adjusted data.

### 4.2. Structural breaks

Structural breaks represent unanticipated shifts in time series, potentially resulting in unreliable estimates. We conducted structural break tests for industrial production and price level, as our primary focus is on the responses of output and price level to monetary policy shocks. Initially, we used OLS to estimate the dependence of industrial production and price levels on all other included variables. We then

applied a test for unknown break dates. The findings indicated a structural break in our time series. In the subsequent analysis, we incorporated two dummy variables to account for these structural breaks in our VAR models at levels. The two dummy variables selected are the first day of lockdown in Vietnam and the day when students nationwide returned to school. However, it is worth noting that the impulse response functions associated with the VAR models, both with and without structural breaks, are strikingly similar.

**4.3. Unit root tests**

We used the Augmented Dickey-Fuller statistic (ADF) to test for the stationarity of all variables. Table 3 presents the results.

**Table 3. ADF test for stationarity or unit root tests**

	Critical values				
	ADF Statistic	p-value	1%	5%	10%
IPI	-2.586353	0.095851	-3.546	-2.912	-2.594
CPI	-5.755844	0.000001	-3.548	-2.913	-2.594
M2	-0.424197	0.90598	-3.575	-2.924	-2.6
Cred	4.411826	1	-3.575	-2.924	-2.6
Inte	-1.379424	0.5921	-3.548	-2.913	-2.594
EXC	-6.027116	0	-3.548	-2.913	-2.594
Oil	-1.260853	0.646887	-3.546	-2.912	-2.594
Chirate	-0.32661	0.92165	-3.546	-2.912	-2.594

*Source: The author's own synthesis using Python*

**4.4. VAR identification for Vietnam**

A structural form of VAR is beneficial for isolating purely exogenous shocks from policy and assessing the impact of these shocks on the variables incorporated in a VAR model (Sims 1986). A structural form VAR can be expressed as follows:

$$A_0 Y_t = \alpha 0 + A_1 Y_{t-1} + A_2 Y_{t-2} p + \dots + A_p Y_{t-p} + u_i; \tag{2}$$

where Yt is an (m x 1) vector of the endogenous variable at time t; α0 is an (m x 1) vector of constants; Ai (i = 1,2, . . .,p) is an (m x m) vector of structural parameters, and ut is an (m x 1) vector of structural shocks. By multiplying Equation (2) by the inverse of matrix A0, we obtain a reduced-form VAR (**Equation (3)**), which can be directly estimated using ordinary least squares.

$$Y_t = g_0 + G_1 Y_{t-1} + G_2 Y_{t-2} + \dots + G_p Y_{t-p} + e_i; \tag{3}$$

where Yt (a vector of endogenous variables) depends on its own lag and the lag of other endogenous variables, along with the forecast error vector et; et = A0-1 \* ut is a linear combination of the structural shocks ut. The subsequent step involves recovering the structural parameters of Equation (2) from the estimated parameters of Equation (3), a process known as identification (Sims 1986). Since the number of unknown elements in a structural VAR exceeds the number of known elements from an estimated reduced-form VAR, the common approach is to impose restrictions on matrix A0 (i.e., the matrix of contemporaneous relationships among endogenous variables of the structural model) guided by economic intuition. If a VAR contains m endogenous variables, at least m(m-1)/2 restrictions must be imposed (Gujarati 2009). In this identification, the variable ordered first is assumed to have contemporaneous effects on all following variables, while the variable ordered last is assumed to affect other variables ordered before it with a lag.

An alternative identification is the structural decomposition (SVAR), in which the matrix A0 can have any structure, provided that it imposes sufficient restrictions (Kim and Roubini 2000)..

In our VAR model, the recursive identification of endogenous variables is represented by Equation (4):

$$\begin{array}{l}
 U_{IPI} \\
 U_{CPI} \\
 U_{M2} \\
 U_{INTE} \\
 U_{CRED} \\
 U_{EXC}
 \end{array}
 =
 \begin{array}{l}
 a_{11} \ a_{12} \ a_{13} \ a_{14} \ a_{15} \ a_{16} \ a_{21} \\
 a_{22} \ a_{23} \ a_{24} \ a_{25} \ a_{26} \\
 a_{31} \ a_{32} \ a_{33} \ a_{34} \ a_{35} \ a_{36} \\
 a_{41} \ a_{42} \ a_{43} \ a_{44} \ a_{45} \ a_{46} \\
 a_{51} \ a_{52} \ a_{53} \ a_{54} \ a_{55} \ a_{56} \\
 a_{61} \ a_{62} \ a_{63} \ a_{64} \ a_{65} \ a_{66}
 \end{array}
 \times
 \begin{array}{l}
 e_{IPI} \ e_{CPI} \\
 e_{M2} \\
 e_{INTE} \\
 e_{CRED} \\
 e_{EXC}
 \end{array}
 \quad (4)$$

The VAR model for Vietnam includes shocks uIPI, uCPI, uM2, uInte, uCred, and uEXC, representing industrial production, prices, monetary base, credit, and exchange rate, respectively. The ordering of output and price level aligns with the nominal rigidity theory, indicating persistence in output and inertia in prices after a monetary policy shock (Christiano, Eichenbaum, and Evans 2005). The policy variables adjust following the information on primary target variables (IPI and CPI): first, the broad money base, followed by interest rates and credit, with the exchange rate as the last variable adjusting based on the earlier values of the other variables in the VAR system.

Granger causality tests support this ordering, showing that economic target variables (IPI, CPI) Granger-cause policy variables (M2, Inte, EXC). M2 Granger-causes Inte and EXC at the 1% significance level, and Cred at the 1% significance level. Inte Granger-causes Cred at the 1% significant level. EXC is Granger-caused by almost all variables (IPI, CPI, M2, Cred).

Our VAR model's endogenous variable ordering (IPI, CPI, M2, Inte, Cred, EXC) for Vietnam is consistent with similar studies in Asian developing countries, supporting the order of economic target variables before policy variables (Raghavan, Silvapulle, and Athanasopoulos, 2012; Disyatat and Vongsinsirikul, 2003; Fung, 2002; Hung and Pfau, 2009).

Based on various criteria, the suggested lag length for the VAR model is four. However, we choose to include only two lags in our estimations, aligning with most selection criteria and the practice in the literature. This choice strikes a balance between capturing relevant dynamics in the data and keeping the model parsimonious for better interpretability (Sims, Stock, and Watson, 1990; Lütkepohl, 2005).

**Table 4. Lag length selection criteria.**

Lag	AIC	BIC	FPE	HQIC
0	-10.02	-9.689	4.462e-05	-9.890
1	-23.90	-20.62	4.308e-11	-22.63
2	-24.23	-17.99	3.908e-11	-21.82
3	-25.64	-16.44	1.882e-11	-22.08
4	-27.47	-15.31	1.548e-11	-22.77
5	-40.54*	-25.43*	2.017e-15*	-34.70*

Source: The author's own synthesis using Python

#### 4.5. Impulse response functions

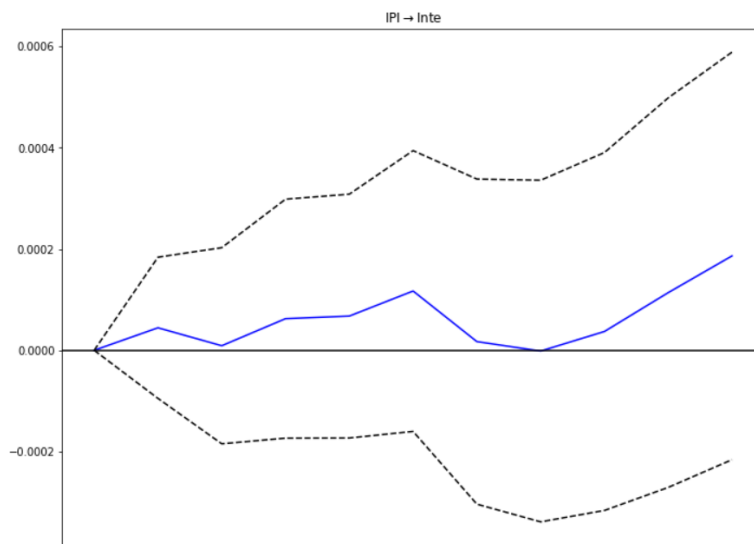
In this subsection, we compute impulse response functions (IRFs) to trace the dynamic response of endogenous variables to exogenous shocks emanating from other variables over a period of 30 months.

IRFs help to predict the sign, magnitude, and statistical significance of the responses to shocks from policy variables (Stock and Watson, 2001).

Below, we illustrates the impulse response functions of output and price levels to a shock (measured by a one standard deviation increase) in policy variables such as policy interest rate, exchange rate, broad money, and credit. We report the 95% confidence intervals for all graphs, represented by the grey-shaded area.

The IRFs offer insights into the impact of various policy shocks on the output and price levels in the economy. By analyzing the patterns, magnitudes, and confidence intervals of the impulse response functions, researchers and policymakers can understand how monetary policy actions might affect macroeconomic variables in the short to medium term, providing crucial information for designing effective monetary policy strategies.

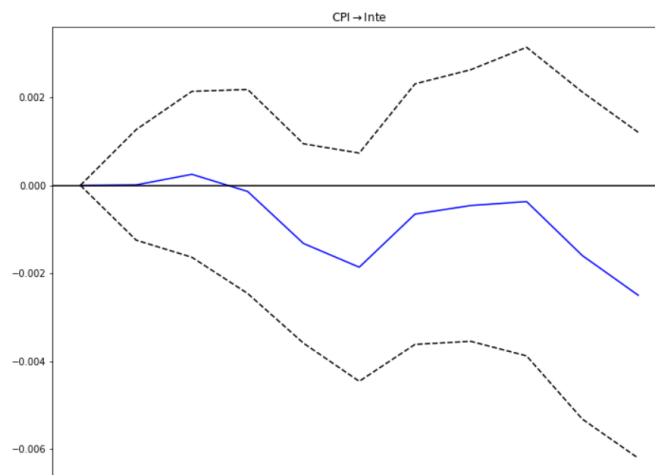
**4.5.1. Shock from interest rate**



**Figure 1. Response of log of industrial production**

*Source: The author's own synthesis using Python*

The impact of the shock from interest rate changes can be observed to produce a notable response in industrial production price levels, as exemplified by the Consumer Price Index (CPI) illustrated in the graph provided. One of the most salient observations is that the industrial production, when expressed in logarithmic form, consistently remains greater than 0. This indicates that the value of industrial production is always above 1 during the time frame being analyzed. The logarithmic Industrial Production Index (log IPI) exhibits fluctuations around a level slightly above 0 before it starts to increase substantially when the interest rate experiences a growth of around 10%. This highlights the strong correlation between interest rate changes and the subsequent effects on industrial production price levels, emphasizing the importance of understanding and monitoring these economic indicators.

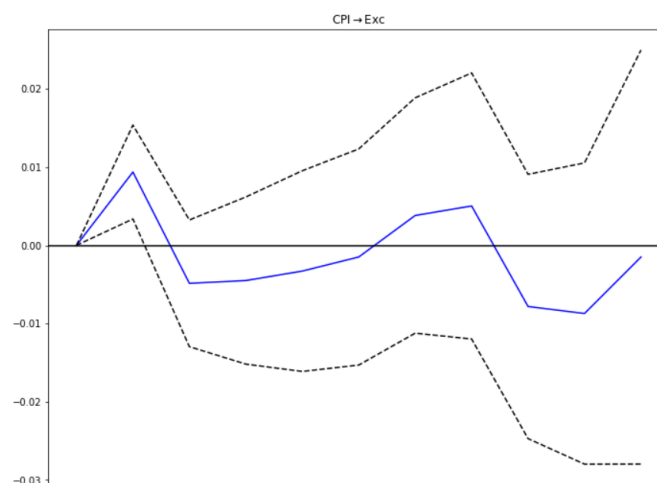


**Figure 2. Response of log of price level**

*Source: The author's own synthesis using Python*

The response of the price level to interest rate shocks is effectively illustrated in the graph above, taking into account a 95% confidence interval. In contrast to the log IPI index, it is evident that the log price level predominantly fluctuates below the baseline of 0 in most situations, with the exception of the initial minor increase in interest rates. The fluctuation becomes more pronounced following an observation of approximately a 15% increase in the standard deviation of interest rates. After this point, the log price level reaches its peak value of -0.002 towards the end of the period under analysis. This highlights the sensitivity of price levels to interest rate changes and the need for careful monitoring of these economic indicators to maintain stability in the market.

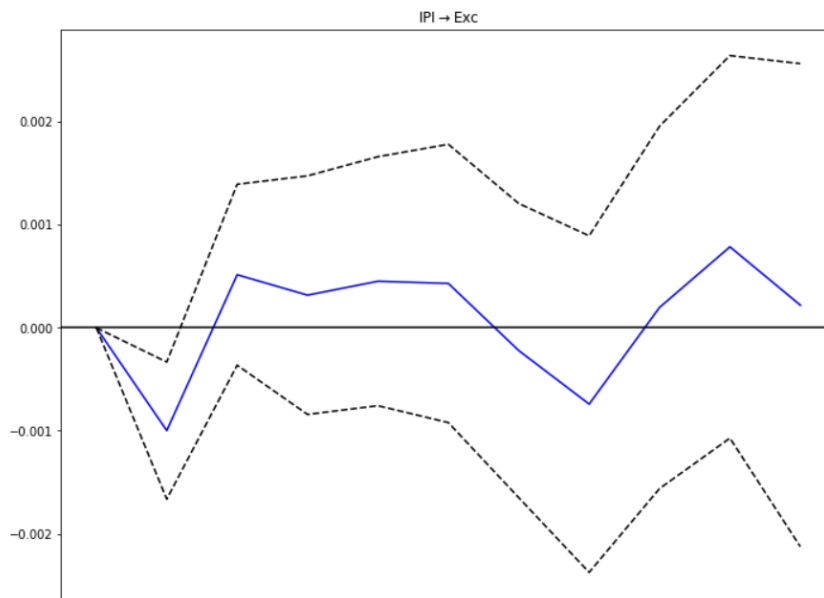
#### 4.5.2. Shock from exchange rate



**Figure 3. Response of log of industrial production**

*Source: The author's own synthesis using Python*

A more notable change in the interaction between the endogenous and exogenous variables is witnessed in the particular case of exchange rate and industrial production. It is now accepted practice, or at the very least acceptable practice, the use log-transformed data has become a crucial step in identifying impulse functions within the research studies using the VAR model. The normality assumption of traditional econometric methods serves as the foundation for the use of log-transformed data in time series regressions and macroeconomic predictions. It seeks to reduce the negative effects that heteroscedasticity and skewness in the level data have on the results of estimation and testing. Several in-sample statistical tests based on the Box-Cox-transformation have been created and used to choose between using data in levels and log-transformed data. Particularly, the log of industrial production fluctuates midway between 0 and be greater when the increase in standard deviation of exchange rate index gets smaller.



**Figure 4. Response of log of price level**

*Source: The author's own synthesis using Python*

A similar pattern can be observed in the relationship between the log price level and shocks from exchange rate changes. However, when the increase in the standard deviation of the exchange rate is relatively small, the log price level displays a stark contrast to the expected peak at approximately 0.01. Instead, it reaches an all-time low of -0.01, highlighting a certain degree of asymmetry in the interactions between these variables. This asymmetric behavior may lead to several thought-provoking discussions within the context of this research paper and could potentially serve as a basis for future research in the field. The exploration of these nuanced relationships can contribute to a more comprehensive understanding of the dynamics between exchange rate fluctuations, price levels, and their interconnected impact on the overall economy.



4.5.3. Shock from broad money

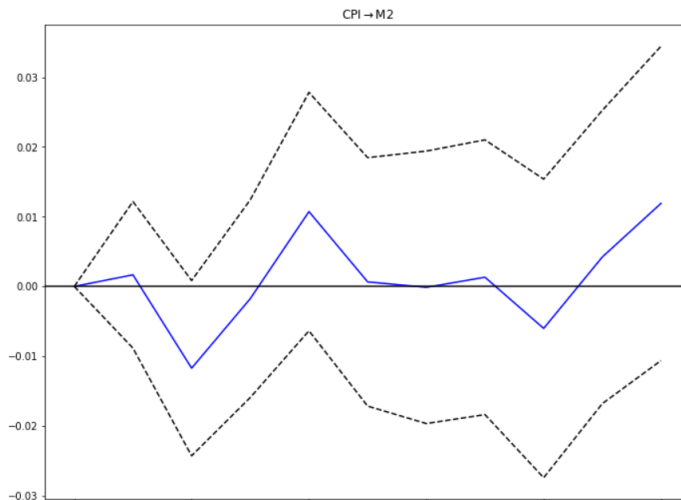


Figure 5. Response of log of industrial production

Source: The author's own synthesis using Python

With regard to broad money, the response of industrial production appears to be divided into two distinct patterns. A larger fluctuation is observed when the standard deviation of broad money increases up to 15%. Following this, a period of temporary stability ensues before the index experiences a considerable drop to nearly -0.01. Subsequently, it demonstrates a significant increase, recovering to reach its original peak value of 0.01.

This dual-pattern behavior suggests that the relationship between broad money fluctuations and industrial production is complex, with different responses depending on the magnitude of changes in broad money. Understanding the intricacies of this relationship is crucial for policymakers and economists, as it can help them develop appropriate strategies to manage the potential impact of broad money changes on industrial production and, by extension, the overall economy.

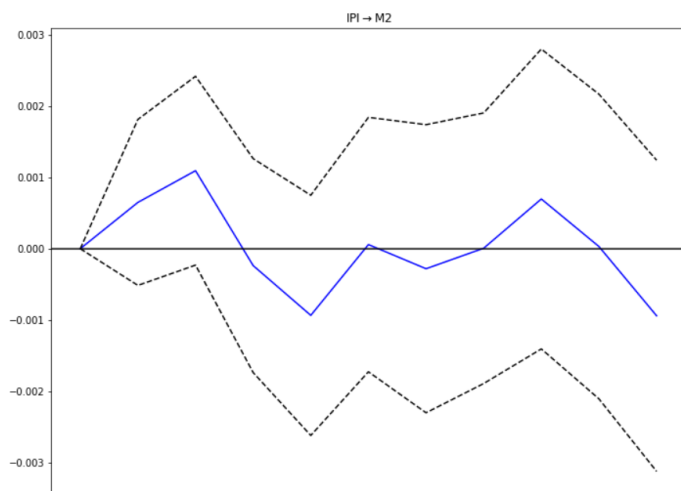


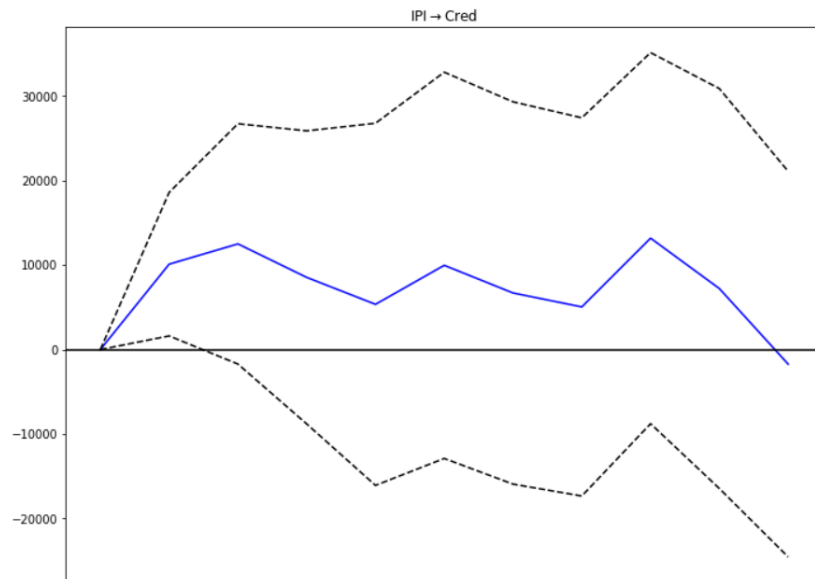
Figure 6. Response of log of price level

Source: The author's own synthesis using Python

A contrasting outcome is presented in the results of the Vector Autoregression (VAR) model examining the response of the log price level to changes in log broad money. Similar to the previous case, the fluctuations can be divided into two distinct phases, with sharper ups and downs occurring when the standard deviation of broad money increases up to 15%. However, there is no period of stability at 0 for this particular scenario. Instead, the log price level rises to around 0.001 before experiencing a sharp decline towards the end of the period under study. This is in contrast to the continuous increase observed in the previous result.

This difference may suggest crucial insights regarding the characteristics of the variables analyzed in this paper and their potential implications for future research. Understanding these disparities could help elucidate the unique dynamics between broad money fluctuations, price levels, and industrial production. This information, in turn, can inform more effective policy decisions and economic strategies that account for the complex relationships among these factors.

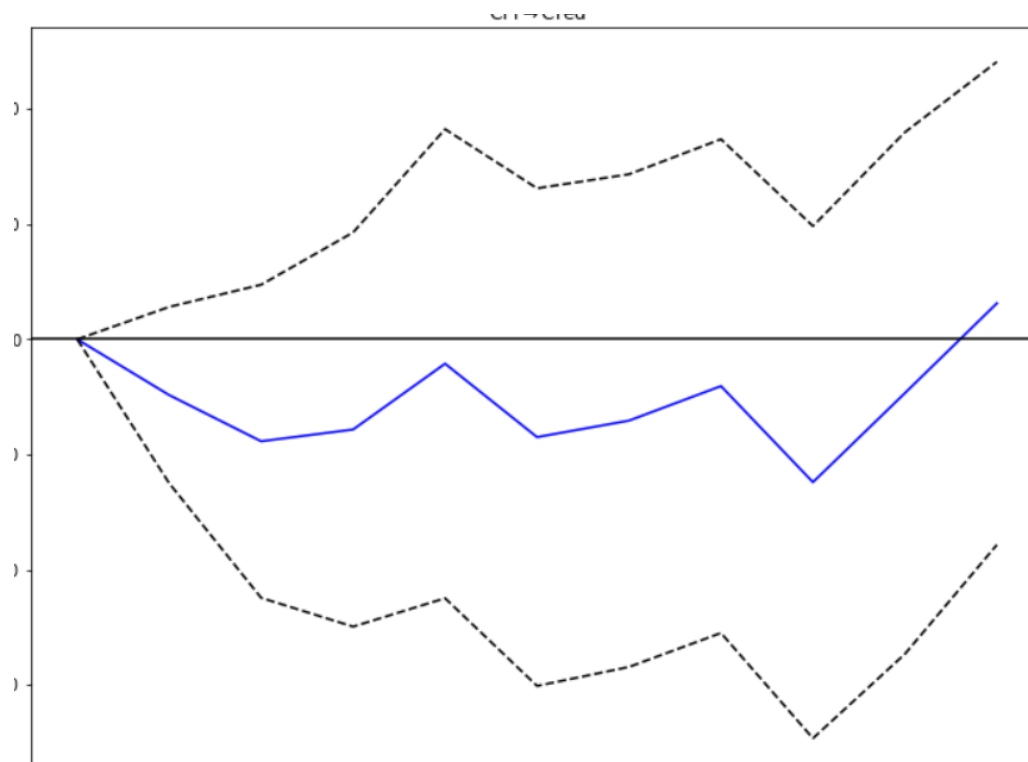
**4.5.4. Shock from credit**



*Figure 7. Response of log of industrial production*

*Source: The author’s own synthesis using Python*

The aforementioned graph provides a clear depiction of a wide fluctuation in the response of the log of industrial production. The results obtained from our analysis reveal that the response initially experiences an upward trend, gradually rising until it reaches a peak at a value of 10000. However, it subsequently undergoes a moderate drop, declining to approximately 5000 before continuing to fluctuate. Eventually, the response hits its lowest point at a negative value of under 0. These findings are of significant academic interest and highlight the dynamic nature of industrial production, which is subject to various external and internal factors. Further research could be conducted to explore the potential drivers behind these fluctuations and their potential implications for economic and policy-making decisions.



**Figure 8. Response of log of price level**

*Source: The author's own synthesis using Python*

The results reveal a prominent trend of negative values persisting throughout the analyzed period. The log price level initially underwent a significant decline before displaying signs of recovery, ultimately attaining a value of approximately -10,000. Beyond this point, the data demonstrated a moderate level of fluctuation, with oscillations observed until the log price level reached its lowest point at -150,000. Nevertheless, the log price level eventually rebounded, achieving its peak at over 10,000 towards the end of the period.

These observations underscore the dynamic nature of the economic landscape, which is influenced by a multitude of internal and external factors. Recognizing and understanding these fluctuations is crucial for policymakers, economists, and market participants in order to make informed decisions and devise effective strategies for navigating the ever-changing economic environment. Additionally, these findings can serve as a foundation for further research, enabling a more comprehensive comprehension of the complex interplay between various economic indicators and their impact on the overall economy.

## 5. CONCLUSION

This study investigated the impact of monetary policy on the real economy in Vietnam during the period of 2018-2022. The key findings can be summarized as follows:

A tighter monetary policy, as evidenced by an increase in interest rates, effectively stabilizes prices in Vietnam. This suggests that when the central bank raises interest rates, it can control inflation and maintain price stability.

Expansionary monetary policy, as indicated by an increase in broad money, has a significant positive effect on industrial production in the country. This implies that when the central bank increases the money supply, it can stimulate economic activity and boost industrial production.

The study also supports the notion that credit expansion in Vietnam can lead to inflationary pressures. This finding highlights the importance of closely monitoring credit growth and implementing appropriate macroprudential measures to prevent excessive credit expansion from causing inflationary problems.

These results offer valuable insights for policymakers in Vietnam and contribute to the existing literature on monetary policy transmission mechanisms in developing economies. By understanding the effects of different monetary policy tools on the real economy, authorities can better design and implement effective policy measures to achieve their macroeconomic objectives, such as price stability and sustainable economic growth.

Our study reveals that a tighter monetary policy, indicated by increased interest rates, effectively stabilizes prices in Vietnam. This aligns with conventional wisdom, as central banks use interest rate adjustments to influence inflation and maintain price stability. Policymakers in Vietnam can utilize interest rate changes as an effective tool to control inflation and achieve macroeconomic objectives.

Our research addresses a gap in the literature by uncovering a negative relationship between interest rates and the consumer price index in the Vietnam market. We also highlight the inflationary pressures associated with credit growth in Vietnam. Policymakers must monitor and manage credit expansion to maintain price stability.

While our findings are valuable, we acknowledge limitations such as potential endogeneity concerns and omitted variable biases. Future research should explore additional monetary policy channels beyond interest rates and credit expansion to gain a comprehensive understanding of their impact on the economy during different business cycle phases in Vietnam. This knowledge can guide policymakers in formulating effective and sustainable monetary policies that promote economic growth, price stability, and overall financial resilience.

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## DEMOGRAPHIC FACTORS AND FINANCIAL LITERACY OF WOMEN IN NEW RURAL AREAS IN HANOI: AN EMPIRICAL RESEARCH

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**ABSTRACT:** *The study investigates the influence of demographic factors on women's financial literacy in new rural Vietnam; more specifically, it focuses on factors reflecting financial knowledge, including financial knowledge, financial behavior, and financial attitudes. Utilizing descriptive analysis, we have a complete picture of the demographic characteristics of 303 samples of women in the new rural area of Hanoi. Of the six demographic factors, 4 subgroups, including age, income, education, and marital status significantly correlate with financial literacy. In addition, all demographic variables and financial knowledge maintain their positive relationship with financial literacy. Thus, in the new rural Vietnam, financial knowledge is one of the positive factors reflecting financial literacy. The significant contributions of the research paper in improving financial literacy in new rural areas of Vietnam are focusing on building financial literacy concepts for individuals, families, and communities; and making recommendations for organizations involved in research, policy formulation, and implementation.*

**Keywords:** *demographic factors, financial literacy, Hanoi city, new rural areas, women*

### 1. INTRODUCTION

Nowadays understanding personal finance is crucial for both the stability and growth of the economy in general as well as the balance and success of each individual. High financial literacy among the populace can help emerging economies' financial sectors efficiently contribute to genuine economic development and the eradication of poverty (Faboyede et al., 2015). And Vietnam is an emerging economy with high economic growth and integration. However, Vietnam's financial system is still far behind many other countries in terms of size, service diversification, and professionalism (Tran et al., 2017). This finding demonstrates a direct connection between Vietnamese people's low financial literacy and their difficulty accessing modern financial services and instruments, which is a barrier to the growth of modern banking and financial services in Vietnam. Even individuals with a strong background in finance can have poor financial literacy. It is therefore crucial to measure financial literacy in Vietnam. From there, it helps determine the best adjustment to satisfy the financial system's needs while also assisting financial policymakers in understanding people's financial literacy and providing solutions.

However, according to Phung Quang and Anh Khuc (2019), the assessment of OECD countries is still used to test financial literacy, which is inappropriate given that Vietnam is an economy in transition. There hasn't been much in-depth research on financial literacy in Vietnam. Previous studies only evaluated how a professional's financial sector competence affected the caliber of financial performance without considering other subjects who were also involved in financial activity. Specifically, previous research has primarily focused on urban areas (Ngo, Le, 2016; Tran, 2017; Nguyen, 2015; Marszaek-Kawa, 2012), and there has also been researching (Atkinson and Messy, 2012; OECD, 2013, 2015) indicating that financial literacy has a positive impact on poverty reduction by increasing income, however, there is little to no evidence for this in rural areas of developing countries like Vietnam.

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In addition, gender is a significant aspect that influences a person's financial literacy. Numerous studies have indicated that financially independent women can be a valuable resource for economic development because they have a significant potential to contribute to the expansion of the economy (Chetna Singh and Raj. Kumar, 2017). The degree of financial literacy of female business owners determines their performance in the development of rural businesses (Atahau et al., 2021). National and global prosperity will increase if women have equal access to education, work opportunities, and financial resources, as well as if they are represented in economic and political decision-making processes. there (Allgood and Walstad, 2016; Marini et al., 2018; Linddahl and Mokvist, 2022).

More specifically, the economic situation and people's lives have improved as a result of Vietnam's rural areas being transformed and upgraded into new rural areas. The rapid urbanization of Vietnam is a significant phenomenon. Urbanization has positively accelerated the process of economic restructuring, moving faster in the structure of industry, commerce, and service, which reflects its impact on poverty reduction. The growth in income and per capita spending is a result of the numerous employment and incomes that this migratory trend has generated in the cities themselves (Ministry of Planning and Investment, 2021). This is a chance for household growth in general and for women in particular. However, this is a significant difficulty because it calls for women in new rural areas to have more sophisticated financial knowledge and abilities.

Based on the aforementioned points of view, the research team believes that studying the demographic characteristics that have an impact on the financial literacy of women in rural areas is crucial for improving the financial literacy of women in new rural areas. Making recommendations and establishing new rural regions in Hanoi are required.

The study consists of 5 main parts. Chapter 1 is a general introduction to the research topic; Next, Chapter 2 is an overview of research on the influence of demographic factors on women's financial literacy in new rural areas. Chapter 3 is the presentation and explanation of the research methods used and data collection. After synthesizing theory, research theory, and survey data, in Chapter 4, the research team will conduct data analysis, thereby giving research results and explaining the influence of variables on the financial literacy of women in new rural areas in Hanoi. And finally, in Chapter 5, based on the research results as well as the influence of the variables on the research subjects, the research team reaffirms the factors that significantly affect the financial literacy of women. women in new rural areas, from which several policy options can be considered, which can help identify actions to improve the financial literacy of new rural women in the region.

## **2. THEORETICAL BACKGROUND**

### **2.1. An Overview of Financial Literacy**

#### **2.1.1. Definition of Financial Literacy**

The concept of financial literacy lacks a clear and agreed-upon definition. Researchers and authors have proposed various definitions, leading to a diverse range of interpretations (Remund, 2010). Some studies have focused on financial knowledge acquired through education programs, while others have explored the relationship between financial literacy and financial decision-making (Bernheim, 1998; Hilgert et al., 2003). The President's Advisory Council on Financial Literacy (PACFL) emphasized the importance of financial decision-making skills (Lusardi and Mitchell, 2014). The OECD provided a comprehensive definition that combines skills, behavior, awareness, attitude, and knowledge, aiming to improve financial well-being and enable participation in economic life (OECD, 2013; French and Mckillop, 2016).

Financial literacy is an important breakthrough in education, and various terms such as knowledge, skills, and behavior are used to describe it (Hung et al., 2009). The diversity of these terms highlights the varied definitions and their potential influence on the data used in research (Allgood and Walstad, 2016; Kimiyaghalam and Safari, 2015). The most comprehensive definition of financial literacy provided by the OECD encompasses financial knowledge, behavior, and attitude, emphasizing the ability to make informed financial decisions for improved financial well-being (OECD, 2013).

In conclusion, synthesizing the definitions from published articles and research terminology, the research group agrees with the most comprehensive definition of financial literacy provided by the OECD (2013). Financial literacy is defined as the knowledge and understanding of financial concepts, and risks, and the skills, motivation, and confidence to apply that knowledge and understanding of financial concepts, knowledge, and understanding in making effective decisions in various financial contexts, aiming to enhance individual and societal financial well-being and enable participation in economic life.

### **2.1.2. The importance of Financial Literacy**

Numerous benefits of financial literacy have been identified, demonstrating its positive impact on individuals and families (Danes and Hira, 1987; Grable and Joo, 1998; Kerkmann et al., 2000; Blalock et al., 2004). Increased financial knowledge encourages greater confidence, self-control, independence, and marital satisfaction (Conger et al., 1999; Allen et al., 2007; Cleek and Pearson, 1985; Kerkmann et al., 2000; Oggins, 2003). Financial literacy also plays a crucial role in household finance by helping families organize their spending efficiently.

In the case of women, the COVID-19 pandemic has had negative consequences that extend beyond their financial recovery capacity (Bucher-Koenen et al., 2021). The financial literacy needs of women in using payment products, savings, credit, and risk management are significant (Demircuc-Kunt et al., 2015).

The success of female entrepreneurs in rural business development depends on their level of financial knowledge (Atahau et al., 2021). If women have equal access to education, employment opportunities, financial resources, and representation in economic and political decision-making processes, domestic and international prosperity will follow (Lindahl and Mokvist, 2022; Marini et al., 2018; Allgood and Walstad, 2016).

## **2.2. An Overview of Financial Literacy of Women in New Rural Areas**

### **2.2.1. Definition of Rural Areas**

According to Decree No. 41/2010/NĐ-CP (2010) issued by the Government of Vietnam, rural areas are defined as territories outside the urban areas, cities, and towns, and managed by the local administration at the commune level. These areas have distinct natural environmental characteristics, socioeconomic conditions, and agricultural activities.

### **2.2.2. Definition of New Rural Areas**

The concept of new rural areas was first mentioned in Resolution No. 26-NQ/TW of the Central Party Committee on Agriculture, Farmers, and Rural Areas (2008). New rural areas are defined as progressive rural areas with synchronized infrastructure and rich cultural life. They preserve the traditional values and characteristics of each region and ethnic group while improving the living standards of the residents.

### **2.2.3. Characteristics of Financial Literacy of New Rural Areas**

The financial literacy of farmers, particularly women, in new rural areas has gained importance as they are the key contributors to the socioeconomic development of these regions. However, there is a lack of comprehen-

sive research or articles on measuring the financial literacy of farmers, specifically women, in new rural areas. The article “Financial Literacy in Vietnamese Rural Areas” (Vietnam State Bank Journal, 2018) surveyed over 400 participants across Vietnam. The results showed that women, especially in the northern region, had higher financial behavior and attitudes scores compared to men, due to their role in managing household finances and borrowing for family economic development. The survey also found regional variations, with higher savings rates in the northern region compared to other regions, while the central region had the lowest. In terms of income, those with higher incomes tended to have better financial attitudes and behavior, particularly in the aspects of financial behavior and attitudes. This suggests that financial knowledge may not necessarily have a direct impact on income, but financial attitudes and behavior can have positive effects.

Currently, financial education is being provided by various institutions in Vietnam, such as credit organizations and individuals participating in microfinance services (Ngo et al., 2017). However, the focus on financial attitudes and behavior in training programs is still inadequate. Therefore, it is necessary to develop more appropriate policies to address this issue.

### **2.3. An Overview of demographic factors**

#### **2.3.1. Reflective factors affecting Financial Literacy in New Rural Areas**

##### **a) Financial knowledge**

Lack of financial literacy is one of the main causes of low financial literacy (Collins, 2012; Huston, 2010; Nicolini et al., 2013). Zhan et al., (2006) show that improving financial literacy can improve financial literacy (see also Taft et al., 2013; Scheresberg, 2013).

*H1: Financial knowledge and financial literacy have a positive relationship*

##### **b) Financial attitude**

Atkinson and Messy (2012) show that attitude is a vital factor in reflecting financial literacy. Financial attitudes are included in the regression of financial literacy as an independent variable in many studies, such as Godwin and Carroll (1986), Godwin and Koonce (1992), and Godwin (1994). Specifically, Godwin (1994) measured the influence of variables on personal financial management and concluded that financial attitude is an important factor to predict an individual’s cash flow. People with a positive financial attitude tend to manage their money better (Atkinson and Messy, 2012; OECD, 2013).

*H2: Financial attitude and financial literacy have a positive relationship*

##### **c) Financial behavior**

Atkinson and Messy (2012) believe that individuals with positive financial behaviors such as prudent budgeting and concern for financial stability have a higher level of financial literacy, while those with negative effects, such as a high reliance on credit loans, have a lower level of financial inclusion. The more positive the financial behavior, the higher the financial literacy. Furthermore, Hilgert et al. (2003), Robb and Wodyard (2011), and Taft et al (2013) demonstrate that this relationship is statistically significant. According to research by Banerjee, Kumar, and Philip (2017), financial literacy has a positive impact on financial awareness, leading to an increase in financial access behavior.

*H3: Financial behavior and financial literacy have a positive relationship*

#### **2.3.2. Demographic factors affecting the financial literacy of women in new rural areas**

##### **a) Age**

Agarwal et al. (2009) said that the group of people between the ages of 18 and 24 have the lowest financial literacy while the group with the highest financial performance is between the age of 53 - 55 years old. Bhushan and Medury (2013) conducted a study in the developing country of India, with a sample of

individuals with paid work in Himachal Pradesh. Looking at the survey results, it can be seen that the older the age, the higher the level of physical education also increases.

*H4: Age and financial literacy are related*

#### **b) Academic level**

Research by Bhushan and Medury (2013) shows that an individual with a higher education level will have a higher financial literacy level. Similarly, individuals with lower EMs are more likely to be in the group whose educational attainment stops at the primary or secondary level, according to Alessie (2011). This result is consistent with the study of Brown et al. (2013), the group that has undergone a university program has a significantly higher rate of correct answers than the group that only stops at the elementary level. Trinh (2017) indicates that higher educational attainment has a strong and positive correlation with financial literacy in Vietnam. The results of the above studies have shown that the level of education is a factor that positively affects an individual's financial position; The higher the educational attainment of the target group, the higher the rate of correct answers to financial questions and vice versa.

*H5: There is a positive relationship between education level and financial literacy*

#### **c) Occupation**

The statement is that those who are more consistent in their career path tend to have higher financial literacy scores. Nanziri and Leibbrandt (2018) pointed out that labor force participants have higher financial literacy scores than those who do not join the labor market. The Vietnamese setting provided another view regarding the relationship between occupation and financial literacy. Those who have jobs whose characteristics are stable show better performance when tested for financial literacy, according to Trinh (2017).

*H6: The fields of profession and financial literacy have a positive correlation.*

#### **d) Marital status**

Brown and Graf (2013) proved that there is a relationship between marital status and financial literacy. Dummy variables were used to test the effect of marriage on the level of financial literacy. The result showed that married contestants outperformed. Calamanto (2011) explained that individuals who are deficient in financial knowledge and practice are more susceptible to wrongful financial decisions. Credit debts overall can threaten the sustainability of a relationship, and therefore, couples have more motivation to increase their financial efficiency. This explanation is consistent with the one provided by Dew (2008), that married individuals enhance their financial proficiency for the sustainability of their marriage. However, when surveying settings with developing economies, mixed results were attained. In defense, Dewanty, N., and Isbanah, Y. (2018) argue that married women carried other household responsibilities other than economic management. Therefore, they are less inclined to enhance their literacy. Sundjaja (2015) stated that the lower average living expenses discourage couples from improving their financial practices as they now have surplus income.

*H7: Marital status and financial literacy have a positive correlation*

#### **e) Number of dependencies**

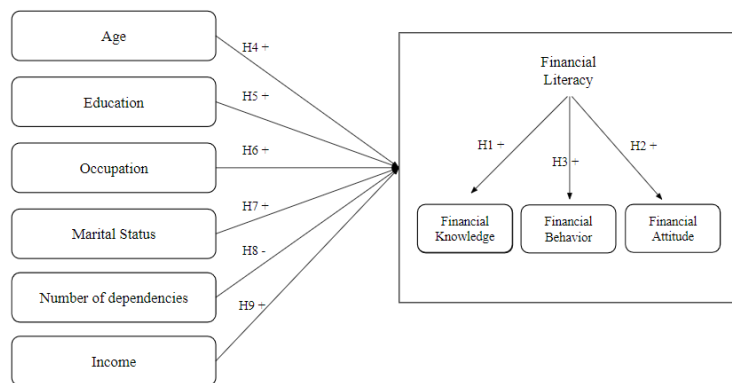
Servon and Kaestner (2008) showed that women with one child performed better in financial knowledge testing than those with two or three children. Those with larger families tend to have lower financial literacy levels, according to Mottola (2013). The explanation behind this is that those who have lower financial literacy tend to be less concerned about family planning. The new rural area with mixed characteristics called for examination to be certain of which side the effect took.

**H8:** *The number of dependents and financial literacy have a negative correlation.*

**f) Income**

Most research on financial literacy considers the effect of income level. Alwee and Salleh (2015), ANZ (2008), Monticone (2010), and Atkinson and Messy (2012) all proved that this is a significant positive relationship. The results showed that income level and financial literacy scores share the same pattern of movements. Members of households with lower income also show a weaker result in testing for financial literacy. Vietnam’s developing economic setting did not exclude itself from this pattern. The income variables showed significant status at a 1% degree of confidence.

**H9:** *Income and financial literacy have a positive correlation.*



**Figure 2.1. Theoretical Framework**

**3. DATA AND METHODOLOGY**

**3.1. Methods**

The research team developed a questionnaire adapted from the OECD (2018) and the Banking Science Research Institute (2022) to suit the new rural women. After adjusting the questionnaire twice, the research team continued to collect data through questionnaires and direct and online surveys. The research team modified the questionnaire to make it more feasible and effective after testing its viability on a small sample of 27 people. Few inquiries with duplicate objectives were eliminated. The authors integrate qualitative and quantitative research within the parameters of the study. The team then went on to create a more appropriate theoretical foundation for the new rural district women in Hanoi after gathering information and eliminating irrelevant samples. The picked studies presented relevance to the developing economy of Vietnam. At the same time, low-income women in less developed areas are the target demographic. The research team believes that the trend among people who meet the criteria is more accurate.

The authors have specifically qualitatively investigated factors impacting the financial literacy of people in rural areas based on combining and developing theories from prior studies as well as theories of financial literacy utilizing data obtained from interviews and surveys. Age, marital status, the number of financially reliant family members, occupation, and income were considered. Combining quantitative methodologies, the study quantified survey data to learn about the financial situation of researched participants.

**3.2. Data collection**

The data was collected through online surveys and direct interviews. The respondent must fit into the age range of 16 and above. Also, the answer is only accepted if the respondent is a resident of the restricted area; temporary guests’ answers would be excluded from the final set of data input. Respondents were

chosen from various locations within each district to ensure coverage. The survey location includes local markets and apartment complexes at different price ranges.

Out of the 250 handout questionnaires, the number of valid responses was 197, while the online survey reached 106 samples. Each interview took 10 to 25 minutes. In total, 303 samples were used for conducting measurements. Older interviewees usually take longer to be interviewed because they are less open about their financial situation.

### 3.3. Descriptive statistics

#### 3.3.1. Demographic factors

**Table 3.1. Demographic factors: Age, Education, Occupation**

	Number	%
<b>Age</b>		
16 - 22	112	36.96%
23 - 35	146	48.18%
36 - 55	26	8.58%
> 56	19	6.27%
<b>Total</b>	<b>303</b>	<b>100%</b>
<b>Education</b>		
College	219	73.60%
Higher education	11	3.63%
High school	35	11.55%
Secondary school	19	6.27%
Elementary school	8	2.64%
None	11	3.63%
<b>Total</b>	<b>303</b>	<b>100%</b>
<b>Occupation</b>		
Family attending	11	3.63%
Searching/Unemployed	21	6.93%
Vocational Training	5	1.65%
Students	6	1.98%
Not working	9	2.97%
Unable to work	9	2.97%
Currently not searching	6	1.98%
Paid jobs	192	63.37%
Retired	3	0.99%
Self-employed	41	13.53%
<b>Total</b>	<b>303</b>	<b>100%</b>

**Table 3.2. Demographic factors: Marital Status, Number of independent family members, Income**

	Number	%
<b>Marital Status</b>		
Single	161	53.14%
Married	133	43.89%
Divorced	3	0.99%
Separated	3	0.99%
Widowed	3	0.99%
<b>Total</b>	<b>303</b>	<b>100%</b>

<b>Number of independent family members</b>		
0	99	31.67%
1	83	27.39%
2	65	21.45%
3	32	7.92%
> 4	24	10.56%
<b>Total</b>	<b>303</b>	<b>100%</b>

<b>Income (million VND)</b>		
< 03	45	14.85%
03 – 05	26	8.58%
05 – 07	76	25.08%
07 – 10	62	20.46%
10 – 12	21	6.93%
12 – 15	26	8.58%
> 15	47	15.51%
<b>Total</b>	<b>303</b>	<b>100%</b>

Most respondents fell between ages 16 and 35, with 6.27% above 56. About two-thirds had or were pursuing a college education, showing a willingness to acknowledge financial limitations in the survey. 63.67% had paid jobs, and 13.53% ran their businesses. The majority earned just under 10 million VND monthly, with the 5-7 million VND group comprising 25.08%. Marital status had two categories: single and married, while the remaining categories accounted for 3%. Family size mainly consisted of 2 financially dependent members.

### 3.3.2. Financial literacy

Each financial knowledge question gave the respondent three options: “true,” “false,” and “unable to answer or understand the question.” Each correct answer will receive a point. The final score will be the percentage of total correct answers out of all. The distribution of scores skewed to the left, with the heaviest-concentrated score range being from 0.33 to 0.44. In general, the whole sample score is quite low. The lower tiers had more respondents than the upper classes.

The questions with the highest right answers dealt with inflation, interest, and calculating simple interest. The inflation question asked about the event leading to price change due to currency depreciation. Interest questions requested identifying interest-bearing loans with details on principal and repayment. Two questions covered calculating simple and compound interest, with over 75% handling basic interest, but under 50% correctly answering the compound interest question. Investment and credit safety questions had a significant percentage of misunderstandings, covering specialized concepts like securities, risk, and return. These questions reflect the low need for such information in financial or investment matters, evident in the scores.

The majority of respondents oversaw choosing their own or their family’s budgets. This shows the need for better financial records to enhance financial decisions. Overall, more than half of the women who participated in the poll used at least one budgeting technique, and keeping track of expenses using handwritten notes is still quite common. Technology and digital tools are still mostly underutilized. Due to its superiority in time, effort, and efficiency savings, this is another technique that must be made more widely known.

The two most typical methods of reserving income were storing it at home and putting it in a savings account at a bank or doing both at once. However, looking at the predominant proportion of cash reserves



at home, we could see a situation that does not optimize income and savings. Due to the higher risk nature, the weights are even lower for the other two choices. Furthermore, financial institutions are not a common choice in newly developed rural communities. In addition to the increased risk, inhabitants of these locations have fewer options when it comes to saving since they lack financial awareness.

Answer	Number	Percent
Deposit withdrawals	59	25.76%
Delay/removed planned expense	171	74.67%
Sell assets	49	21.40%
Overtime/Extra job	153	66.81%
Demand Government's support	68	29.69%
Demand family/friends' support	133	58.08%
Family/friends' loan	131	57.21%
Advance salary	51	22.27%
Pawn shop	41	17.90%
Non-depository institutions' loan	42	18.34%
Overdraft	67	29.26%
Credit card	59	25.76%
Banking institutions' loan	45	19.65%
Personal/Non-official institutions loan	54	23.58%
Peer-to-peer lending (P2P)	41	17.90%
Delay or avoid paying bills	74	32.31%
Other	4	1.75%

Table 4.7 questions were aimed at those who experienced difficulties covering their living expenses in the last 12 months. Many are currently struggling financially because of the epidemic, and it is predicted that the situation will get worse and last longer in places where there are still constraints on the degree of economic development. 229 of the 303 survey samples revealed financial challenges within the designated time limit.

Answer	Number	Percent
I considered several options before deciding	180	59.41%
I considered many different options from a single financial institution	64	21.12%
I did not consider any option	31	10.23%
I did consider some options but was unable to reach the final decision	38	12.54%
I did not have the need to look for any financial instruments recently	39	12.87%
Price comparing websites	104	44.64%
Hired financial consultant	54	23.18%
Advertisement	65	27.90%
Family/friends reference	205	87.98%
Influential individuals' reference	69	29.61%
Financial Institution consultancy	111	47.64%
Other	43	18.45%

Of the 303 survey samples, 223 had considered financial products with an investment element. The questionnaire is designed to examine behavior when participating in investing. More than 60% of the survey sample had considered multiple options, but up to 21.2% only considered options from a single financial in-

stitution. This demonstrates that women in rural areas who are new to investing are still not very engaged in doing so. Although the number of considerations is not small, the effect is not high when, among the products considered, up to a fifth still could not find a suitable option, accounting for 12.54% of the total sample.

The study considers the source of information for the procedure to provide a clearer picture of how effective women are at looking for and selecting investment goods in new rural areas. By deducting the number of responses from the sum of “I did not consider any options” and “I did not need to look for any financial instruments recently”, the weight is computed based on the number of women who have thought about utilizing investment products and selected financial items recently. The results show that 223 samples are eligible to make statistics for the information source aspect. It is clear from them that most customers base their assessment of product quality on their friend’s and family’s views. This method’s advantage is that it allows the user to learn from the first-hand knowledge of other investors. As we consistently offer competitive prices on everything we carry, however, the prices on our website are subject to change.

**4. RESULTS**

**4.1. Descriptive statistics**

As for the result, the authors first start with Cronbach’s Alpha, then EFA and CFA to analyze the accuracy and reliability of data before running SEM.

In the first step - Cronbach’s Alpha, the authors used SPSS (Statistical Package for Social Sciences) to measure the removal of variables using the reliability test. Thus, we performed the selection of Cronbach’s Alpha if Item Deleted. Then, we compared each group of variables’ Financial Behaviors, Financial Attitudes, and Financial Knowledge, and if a variable had Cronbach’s Alpha if the Item Deleted > Cronbach’s Alpha of the group of variables and/or Corrected Item-Total Correlation < 0.3, that variable would be eliminated to increase Cronbach’s Alpha - the strong correlation between variables. After removing the variables that met the above conditions, the remaining variables had the following Cronbach’s Alpha values. In the second step - EFA, the authors established the following criteria for conducting EFA analysis:

**Table 4.5. Reliability Testing**

	<b>Cronbach's Alpha</b>	<b>Explained variables</b>	<b>Variable's name</b>	<b>Correlation</b>	<b>Cronbach's Alpha if deleted</b>
<b>Financial Attitude (ATT)</b>	0.669	4	A22	0.451	0.603
			A23	0.618	0.483
			A24	0.372	0.654
			A25	0.379	0.651
<b>Financial Knowledge (KNOW)</b>	0.758	5	K13	0.364	0.742
			K151	0.529	0.697
			K152	0.595	0.677
			K153	0.639	0.661
			K154	0.5	0.705

<b>Financial Behavior (BE)</b>	0.697	5	B331	0.369	0.685
			B332	0.566	0.595
			B333	0.544	0.607
			B37	0.53	0.613
			B344	0.299	0.694

First, the Kaiser-Meyer-Olkin (KMO) coefficient must be equal to or greater than 0.5 ( $0.5 \leq KMO \leq 1$ ). If this value is less than 0.5, factor analysis may not be suitable for the research data. The first EFA results were as follows:  $KMO = 0.718 > 0.5$ , sig Bartlett’s Test =  $0.000 < 0.05$ , thus confirming that the exploratory EFA analysis is appropriate.

The factor loading was set at 0.3. After conducting the second EFA analysis, the authors could proceed to use 10 convergent observed variables and differentiate them into 3-factor groups.

In this case, the 3 factors include Financial Knowledge, Financial Behavior, and Financial Attitude. Specifically, Financial Knowledge consists of 2 observed variables, including understanding investment and understanding credit safety. Financial Behavior includes 4 observed variables related to budgeting, saving, and financial shock preparedness.

In the third step – CFA, the structure of the Financial Attitude domain consists of questions related to subjective financial perception. The research team used various indices to evaluate the model fit according to Hu and Bentler (1999). The Chi-square/df ratio has a value of  $2.11 < 3$ , indicating a good model fit. The CFI index has a value of  $0.936 > 0.9$ ,  $GFI = 0.958 > 0$ .

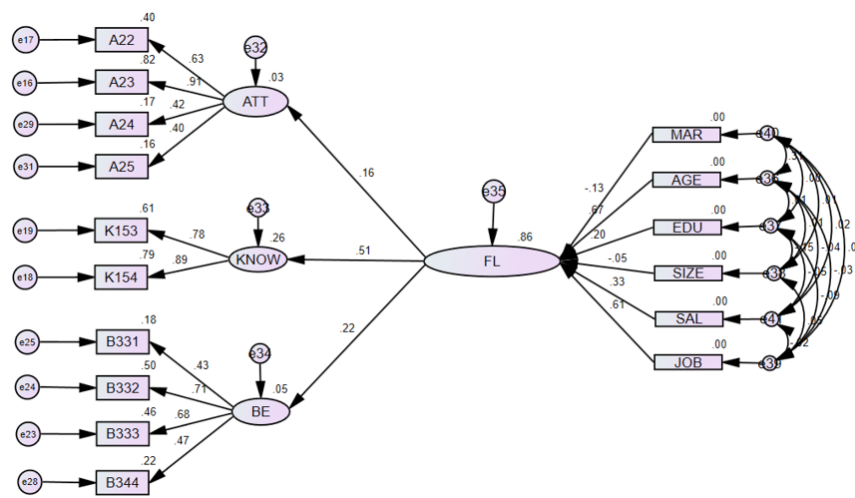


Figure 4.2 SEM Result

From the SEM model (Figure 4.5), the authors observed that the attitudes towards finance (ATT), financial behaviors (BE), and financial knowledge (KNOW) all have a positive impact on financial literacy (FL). Age (AGE), education level (EDU), and income (SAL) also have a positive relationship with financial literacy (FL). However, the number of dependents (SIZE) currently has a negative coefficient on financial literacy. Therefore, the relationships between the observed variables and the reflected variable have an impact on financial literacy according to the constructed hypothesis.

#### **4.2. Internal Factors' Impact on Financial Literacy**

Regarding financial knowledge, the SEM model shows that there is a positive relationship between financial knowledge and financial literacy. This result is consistent with the results from the studies of Collins (2012), Huston (2010), and Zhan (2006). For new rural women in Hanoi, equipping them with this knowledge helps them improve their investment skills as well as their use of credit products.

Regarding financial attitudes, individuals with higher financial attitudes will lead to higher financial literacy scores. This result corresponds to the one studied by Le (2015) and Nguyen and Le (2016).

It has been demonstrated that there is a positive and significant association between financial behavior and financial literacy. Studies by Atkinson and Messy (2012), Hilgert (2003), and Banerjee, Kumar, and Philip (2017) lend credence to this conclusion. Financial Literacy scores will be greatly raised by improvements in the standard and quantity of active financial behavior practice. Higher levels of financial literacy are associated with desirable financial behaviors like cautious budgeting and concern for financial stability, whereas lower levels of financial literacy are associated with negative behaviors like being overly reliant on credit and loans.

#### **4.3. Demographic Factors' Impact on Financial Literacy**

Financial literacy's demographic factor is influenced by various factors, including age, education, family structure, income, marital status, and occupation. Research suggests a positive correlation between age and financial literacy, with older individuals exhibiting higher levels of financial literacy (Bhushan and Medury, 2013; Brown, 2013). This can be attributed to their greater engagement with financial products and behaviors. Older age groups, particularly those over 23, also demonstrate better comprehension of complex financial information. Education level is another important factor, as higher education is associated with higher financial literacy scores (Bhushan and Medury, 2013; Trinh, 2017). Higher education equips individuals with the ability to access and assimilate complex financial knowledge effectively.

The study reveals a negative link between financial literacy and the number of dependent family members (Mottola, 2013). Women with more family members, especially dependent children or elderly relatives, tend to have lower financial literacy scores. This is likely due to the additional responsibilities and roles that women take on, which may divert their attention from financial matters. Moreover, households with poor financial literacy are often less engaged in family planning.

Income and marital status also play a role in financial literacy. Higher-income individuals tend to have lower financial literacy scores (Morgan and Long Q. Trinh, 2017), possibly because they have more financial options and complexities to navigate. Married women, particularly newlyweds in rural areas, tend to have lower financial literacy compared to single or unmarried women (Dewanty and Isbanah, 2018). This can be attributed to the additional responsibilities they assume within the family, leaving them with less time and inclination to actively manage their finances.

Occupation is another factor influencing financial literacy, with individuals who work for a salary or are self-employed exhibiting higher financial literacy scores (Nanziri and Leibbrandt, 2018; Banks and Oldfield, 2007; Bhushan and Medury, 2013). This suggests that the nature of one's occupation may provide exposure and experience in managing personal finances. Understanding these factors can inform targeted efforts to improve financial literacy among different demographic groups.

### **5. CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1. Research Conclusion**

Looking at the results provided for demographics, we discovered some interesting findings. First, out of 6 demographic subgroups, only four subgroups, including Age, Income, Education, and Marital

Status, significantly correlate with financial literacy. The results show that in the new rural areas when the economic situation is innovating and developing, Age status, Marital status, and Income have a positive relationship with financial literacy, however, Education is negatively related. More specifically, Age is the main factor contributing to the decision on the financial literacy level of new rural women. Older women will often make investment decisions based on experience and safety, while young people today are more adaptable to recent changes such as digital finance.

Turning to the results from the reflection factors, we find several other important implications. First, all demographic variables and financial literacy maintain a positive relationship with financial literacy. Thus, in rural Vietnam, financial knowledge is one of the positive factors reflecting financial literacy. Specifically, individuals with good knowledge about investing or lending will have better investment and saving skills. Next, we find that a positive financial attitude leads to higher financial literacy. Specifically, if the subject accurately and positively evaluates changes in the economy, or invests and saves, then he or she will be more accurate and positive. This view is also supported by Le (2015), Nguyen and Le (2016). Therefore, improving financial attitudes through different methods can help people improve their financial literacy. Finally, the results showed that financial behavior positively reflects financial literacy; For that reason, hypothesis H3 is accepted. Specifically, if people invest, save, and spend correctly; one's understanding and attitude toward the economy, in general, will be more accurate and positive. Therefore, it is necessary to develop a good savings and investment portfolio.

Financial literacy is still new in Vietnam, and there has yet to be a specific implementation program to improve financial literacy for the people, especially women in the new rural areas of Vietnam who still have difficulty orienting. Based on the above contents, financial literacy programs should focus on curriculum and news channels, television programs on investment and savings planning, financial literacy, and financial attitudes. Policies should encourage those with low incomes and education levels to consolidate and improve financial literacy to improve living standards and economic development.

## **5.2. Proposing and recommending policies to improve the financial literacy of new rural women in the region**

### **5.2.1. Recommendations to the Government and Specialized Agencies**

New rural women are a significant demographic group in the Vietnam region, and their level of financial literacy is relatively low. An increasing number of National Strategies for Financial Education in Vietnam are now coordinating stakeholder initiatives, which is also a vital objective of the currently developing strategies.

*Firstly*, actively facilitate women to simplify terms and conditions and provide more accessible financial services, such as the aging system, insurance, pensions, healthcare and social security (care), education, and employment in order to raise women's awareness of investment.

*Second*, monitor developments in these areas to identify potential collaborative work with relevant partner organizations. Coordinating institutions and policymakers may consider combining financial education with financial inclusion and more inclusive government action to address geographic, demographic, infrastructure, financial service delivery, and other challenges.

*Third*, rely on a holistic and strategic approach to addressing uncertainties and vulnerabilities, which is especially important for new rural women.

*Fourth*, use evidence-based approaches – standards, for example, the organization of national surveys and participation in regional and international data collection activities, monitoring, evaluation, and other

activities. Taking action to address their insights in further financial education initiatives can have a tangible impact on the financial literacy levels of rural people in the region.

### **5.2.2. Cooperation and synergies of stakeholders enhancement**

New rural women are only sometimes considered the financial education target group of the National Strategy on Financial Education. They have specific needs as a socio-demographic group (and also from different segments) and often live in hard-to-reach areas where they benefit less from many financial institutions. Hence, stakeholders need to address the issue of trust in financial institutions and address problems of rural population availability and readiness.

*Firstly*, stakeholders can collaborate with credible, relevant public sector organizations, including international organizations, bilateral donors, non-profit organizations, financial industry representatives, and microfinance institutions.

*Second*, stakeholders can establish and develop a women-only group to assist women in locations where they cannot leave their homes for any kind of information so that they can learn skills in money management basics, their importance, and how these skills can help them in managing financial and family conditions.

*Third*, when compared to spending, the ratio of saving to family income is meager. Women manage family spending by reducing unexpected expenses and starting to save money in banks/financial services institutions. Banks can increase the awareness of rural people's savings.

### **5.2.3. Effective programs development and implementation and successful initiatives replication**

Some programs in Vietnam have already developed or refined a strategic approach to financial education; however, further improvement in the quality and effectiveness of financial education initiatives needs to be considered. This will provide a well-informed basis for scaling up successful programs to increase impact and behavior change that can lead to greater financial resilience and well-being.

*Firstly*, financial education initiatives can cooperate with stakeholders and especially with community organizations and intermediaries. In doing this, it is essential to understand the local context of the region and village, as there are many cultural and social differences between regions and even between towns within the same area.

*Second*, financial education initiatives work with local community leaders, cooperatives, and business organizations. For example, farming families are key components of rural society, embracing values as they must cooperate and work together to maintain a successful farm. Or build their financial advisory organizations in rural areas to oversee financial literacy services.

*Third*, financial education initiatives build on synergy and focus on cost-effective methods with lasting impact. When warranted and to exploit synergies and cost-effective approaches, trainer training and financial education courses for rural people can also be part of the programs. Working with chambers of commerce and industry associations with existing training facilities and faculty/participant accommodation may be worth exploring.

*Fourth*, financial education initiatives design programs include a combination of innovative delivery methods, including behavioral science and digitization (Internet, social media), with traditional methods (traditional) regional radio, rural radio) to reach large numbers of the rural population and build trust. Focus on changing behavior by promoting budgeting tools, interest tables, and more. And use simple, informative, and straightforward content, and integrate the provision of financial education into the local social and cultural context.

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## APPENDIX

Number	Variables	Estimating
Financial Knowledge		
B1.1	Understanding of Inflation	1 point for correct answer, 0 point for the remaining answers
B1.2	Understanding of interest rate	1 point for correct answer, 0 point for the remaining answers
B1.3	Understanding of single interest rate	1 point for correct answer, 0 point for the remaining answers
B1.4	Understanding of compound interest rate	1 point for correct answer, 0 point for the remaining answers
B1.5.1, B1.5.2, B1.5.3	Understanding of investing	1 point for correct answer, 0 point for the remaining answers
B1.5.4	Credit safety	1 point for correct answer, 0 point for the remaining answers
Financial Attitude		
B2.1	Objectivity	1 point for “1” and “2”, 0 point for the remaining answers
B2.2, B2.3	Financial Activeness	1 point for “1” and “2”, 0 point for the remaining answers
B2.4, B2.5	Financial Activeness	1 point for “4” and “5”, 0 point for the remaining answers
Financial Behavior		
B3.1.1, B3.1.2	Attitude towards financial situation	1 point for “1” and “2”, 0 point for the remaining answers
B3.1.3, B3.1.5, B3.1.6,	Financial recording and planning	1 point for “4” and “5”, 0 point for the remaining answers
B3.1.4, B3.1.7	Financial recording and planning	1 point for “1” and “2”, 0 point for the remaining answers
B3.2.1, B3.2.2	Budgeting	1 point for “1” and “2”, 0 point for the remaining answers
B3.2.3, B3.2.4,	Budgeting	1 point for “4” and “5”, 0 point for the remaining answers
B3.2.5	On-time bill payment	1 point for “4” and “5”, 0 point for the remaining answers
B3.2.6	Digital Finance	1 point for “1” and “2”, 0 point for the remaining answers
B3.2.7, B3.2.8	Financial sustainability	1 point for “4” and “5”, 0 point for the remaining answers
B3.2.9	Overspending	1 point for “1” and “2”, 0 point for the remaining answers
B3.3.1, B3.3.2, B3.3.3, B3.3.4	Budgeting	1 point if the respondents perform at least 2 activities, 0 point for the remaining answers
B3.4	Provision for financial shocks	1 point if the respondents perform at least 2 activities, 0 point for the remaining answers
B3.5	Expensing	1 point if the answer is “No”, 0 point for the remaining answers
B3.6	Financial shocks coping	Non-scoring question
B3.7	Choosing financial products	0 point if the answer is “I do not invest” or “I did not consider any option”, 1 point for the remaining answers
B3.8	Source of information	1 point if the answer is “Hired financial consultant”, 0 point if the answer is None, 0.5 point for the remaining answers

## THE IMPACT OF DEBT OVERHANG ON THE INVESTMENT EFFICIENCY AT THE FIRM-LEVEL IN VIETNAM

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*ABSTRACT: This paper is about the impact of debt overhang on the investment efficiency at the firm-level in Vietnam. The authors used data from 508 financial and non-financial corporations operating in 10 industries in Vietnam. The results of the study shows that debt overhang has a negative impact on the investment efficiency of companies. This paper also shows that there is a nonlinear relationship between debt overhang and investment efficiency. Moreover, the authors indicate that growth opportunities can mitigate the negative impact of debt overhang on investment efficiency. Under the effect of growth opportunities, debt overhang has a positive impact on investment efficiency.*

*Key words: debt overhang, investment efficiency, non-linear effect, growth opportunity.*

### 1. INTRODUCTION

During business operations, companies face various risks and challenges that can greatly affect their performance, such as: the coronavirus pandemic, supply chain disruptions, inventory shortages, and declining customer demand. Addressing these issues requires strategic decision-making and capital allocation to minimize risks and maximize outcomes. However, in Vietnam, many companies have experienced low investment efficiency, leading to significant losses and even bankruptcies due to suboptimal project implementation and inefficient capital use.

Researches show that excessive debt, or debt overhang, significantly affects the investment efficiency of companies. Companies burdened with debt overhang may face capital depletion, debt defaults, and hindered investments, impacting the investment climate. Global financial institutions have reported a rise in capital markets in developing and emerging economies (EMDEs) due to economic growth policies, leading to increased debt levels. For instance, in China, corporate debt exceeded 160% of GDP in 2017. Similar trends have been seen in Vietnam. Given the consequences of debt overhang, there's a growing need to study and explore potential solutions for effective debt management. This issue has gained attention from various stakeholders, including company managers, shareholders, investors, credit institutions, and government agencies.

Though several studies exist on this subject in countries like China and Nigeria, there's a noticeable absence of research in Vietnam, specifically on debt overhang's impact on investment efficiency. This study aims to analyze how debt overhang affects investment efficiency at the firm-level in Vietnam. It explores the relationship between investment efficiency and debt overhang, considering development opportunities' influence. The research will offer valuable insights for future studies and businesses operating in Vietnam. Based on findings, practical solutions will be proposed to help Vietnamese companies access relevant reference materials, make informed financial decisions, and improve investment outcomes.

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## 2. THEORETICAL FRAMEWORK

### 2.1. Theory 1 - The impact of debt overhang on the investment efficiency at the firm-level

Currently, Vietnam is named among the fastest growing economies in the region and the world. However, the Vietnamese economy is facing challenges in maintaining stability, especially regarding managing the debts of businesses. Increasing debt overhang can lead to insufficient resources for debt repayment and other business activities; decreasing the effectiveness of investment activities, and affecting the overall economic development. Therefore, close management of debts and evaluation of investment efficiency is crucial. Investment efficiency increases labor productivity, contributes to economic growth, and improves people's quality of life, while minimizing risks and improving market competitiveness.

In this context, understanding the relationship between debt overhang and investment efficiency will help businesses make informed investment decisions and achieve optimal effectiveness. The following compiled experimental studies serve as the basis for proposing the research methodology in this study.

This research is based on Myers' (1977) theory: "The determinants of corporate borrowing" regarding the factors influencing corporate borrowing. Myers demonstrated that outstanding debt is the primary cause of debt overhang, reducing investment incentives of businesses. Short-term debt is suggested as a solution to improve investment efficiency since investing maturing debts before opportunities arise allows the company to make investment decisions as if fully equity-owned, reducing the debt overhang burden on businesses.

Aligned with this perspective, several studies agree that corporate debt overhang significantly affects investment decisions and efficiency of businesses. In Eduardo Borensztein's study (2020), the authors highlighted the rising corporate debt in EMDEs (Emerging Market and Developing Economies), negatively affecting business investments, with varying effects among different scales of businesses. Higher existing leverage correlates with a higher marginal rate of investment. Besides, the research conducted by Serhan Cevik and Fedor Miryugin (2020) also suggests that high corporate debt can become a burden for non-financial firms, particularly during severe economic downturns, and companies with high leverage tend to have lower investment levels.

From these studies, it is evident that businesses with high short-term debt ratios benefit greatly. Businesses gain financial management flexibility by using short-term debt to finance investment projects and meet short-term financial needs. Additionally, short-term debt minimizes financial risks and improves profitability with lower interest rates. It also enhances access to lower-cost capital and improves credit ratings. Increasing the use of short-term debt can address overinvestment and underinvestment situations for companies.

In the paper "Debt overhang, rollover risk, and corporate investment: evidence from the European crisis" i.e (Kalemli-Özcan, 2022), the authors used a large sample of firms before and after 2008 - the global financial crisis to measure the interaction between corporate leverage, debt maturity, and investment activities. They found that debt overhang and rollover risk significantly hindered corporate investment during the European debt crisis. Specifically, companies with higher leverage ratios will reduce their investment more, while those relying more on short-term debt faced higher rollover risk and reduced their investment; contrary to normal times when companies that borrow more short-term debt tend to invest more. This highlights the risks of excessive reliance on short-term debt to finance investment during good times.

In the paper "Debt overhang and investment efficiency" i.e (Alexander Popov, Francesca Barbiero, and Marcin Wolski, 2018), the authors used data from 8.5 million companies in 22 countries, utilizing

comprehensive information on firm investment and debt. The authors (2018, p.31) stated that “while debt overhang reduces firm investment, this effect is less pronounced for firms operating in sectors facing good global growth opportunities”. This result aligns with the disciplining role and contradicts the underinvestment problem proposed by Myers (1977). Additionally, debt overhang, especially dominated by short-term debt, positively impacts reduced investment allocation. In the context of a banking crisis, debt overhang can be reversed, having a negative effect on investment allocation.

## **2.2. Theory 2 - The nonlinear impact of debt overhang on the investment efficiency at the firm-level**

In addition to finding that debt overhang has a negative impact on firm investment efficiency, the study “Debt overhang and investment efficiency” i.e (Alexander Popov, Francesca Barbiero, Marcin Wolski, 2018) also found a nonlinear effect of debt overhang on firm investment efficiency. The paper “Theory of the firm: Managerial behavior, agency costs and ownership structure” i.e (Jensen and Meckling, 1976) provided a theoretical basis, suggesting that moderate debt levels discipline firm investment. Meanwhile, debt overhang can negatively impact investment efficiency, particularly for companies near bankruptcy. The combination of these arguments indicates a concave relationship (i.e nonlinear relationship) between debt overhang and investment efficiency.

The study “Corporate Debt Overhang and Investment: Firm-Level Evidence” i.e (Eduardo Borensztein and Lei Sandy Ye, 2020) also demonstrated the nonlinear relationship between these two variables. The authors found that debt overhang is a complex and non-linear concept that is difficult to capture in a linear form. Specifically, at low levels of debt overhang risk, the level of debt may not be related to investment decisions. However, when the debt overhang risk exceeds a certain threshold, investment begins to respond to the level of debt. Various factors, such as future profit volatility and growth prospects, which may interact with the level of debt in affecting firm investment. The effect of debt overhang is more severe for companies with high debt levels compared to those with low debt levels, demonstrating the sensitivity of investment to debt overhang and the nonlinear relationship between debt overhang and investment efficiency.

## **2.3. Theory 3 - The impact of debt overhang on the investment efficiency under the influence of growth opportunities at the firm-level**

Apart from the negative impact of debt overhang on investment efficiency, we want to explore other effects of debt overhang on investment efficiency under different growth opportunities. In the study “Debt overhang and investment efficiency” i.e (Alexander Popov, Francesca Barbiero, and Marcin Wolski, 2018), the authors showed that in normal conditions, debt overhang reduces investment efficiency. However, for firms operating in industries with good global growth opportunities, those with higher levels of debt overhang actually have higher investment efficiency than those with lower levels of debt overhang. However, the positive impact of debt on investment efficiency may be limited in three situations: when debt is too high, when there is a higher proportion of short-term debt, and during global financial crises. These effects suggest possible misallocation of investment due to bad credit market conditions during economic crises.

## **3. RESEARCH METHOD**

### **3.1. Data sampling**

The study analyzes data from 381 business firms covering the period 2008-2021, classified into 10 industry sectors based on GICS (Table 2). The data is collected from Refinitiv Eikon. Using panel data, the study explores the connection between debt overhang and investment efficiency. The study employs three regression methods, namely Pooled Ordinary Least Squares (Pooled-OLS), Fixed Effects (FEM), and

Random Effects (REM). After conducting F-Test and Hausman test, the study utilizes the FEM regression method with Stata 17.0 software.

### 3.2. The measure of the dependent variables

As previously mentioned, the dependent variable in this study is the firm's investment efficiency. To align with the research objectives, the study will adopt the method proposed by McNichols and Stubben (2008), Biddle et al. (2009), Goodman (2014), and Edwin Lok (2021). These studies suggest measuring unexpected investments by the absolute value of the residual from the regression model with fixed effects by industry and year using the following equation:

$$CE_{i,t} = \beta_0 + \beta_1 SG_{i,t-1} + \beta_2 Q_{i,t-1} + \beta_3 CFO_{i,t} + \beta_4 Inv_{i,t-1} + \varepsilon_{i,t} \quad (4)$$

Where:

- $CE_{i,t}$ : represents the firm's capital expenditure, which refers to the money invested in purchasing, maintaining, or enhancing fixed assets like buildings, vehicles, equipment, or land for the company's business operations.

- $SG_{i,t-1}$ : represents the variable indicating the firm's revenue growth rate in the previous year, measured as follows:

$$SG_{i,t-1} = \frac{\text{revenue}(t-1) - \text{revenue}(t-2)}{\text{revenue}(t-2)}$$

- $Q_{i,t-1}$ : represents the firm's Tobin's Q ratio in the previous year, which is a measure of the company's value and investment efficiency, calculated as:

$$Q = \frac{\text{Market value of debt} + \text{Market value of equity}}{\text{Book value}}$$

- $CFO_{i,t}$ : represents the cash flow from the firm's operating activities, such as supplying goods or services to customers.

- $Inv_{i,t-1}$ : represents the total amount of investment made by the firm in the previous year, calculated as:

$$Inv = \text{Long-term investment} + \text{Short-term investment}$$

- $\hat{\varepsilon}_{i,t}$ : represents the residual of model (4). This residual is used as a measure of unexpected investments. In Goodman's (2014), the author argues that good investment choices are often indicated by smaller deviations from expectations. Therefore, to ensure consistency in the sign, the investment efficiency of the company will be the absolute value of the model's residual multiplied by -1.

$$IE = -|\hat{\varepsilon}_{i,t}|$$

### 3.3. Model 1: The impact of debt overhang on the investment efficiency at the firm-level

To investigate the relationship between debt overhang and investment efficiency, we employed a fixed effects model with industry and year fixed effects. The model aims to examine the impact of debt overhang on investment efficiency, and the following econometric model are as follow:

$$IE_{i,t} = \beta_0 + \beta_1 DO_{i,t-1} + \beta_2 Control_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

**3.4. Model 2: The nonlinear impact of debt overhang on the investment efficiency at the firm-level**

In model (2), the squared debt overhang variable (DOsq) was included in model (1) to examine any changes in the relationship between debt overhang and investment efficiency. This addition enables a more thorough examination of the nonlinear relationship between debt overhang and investment efficiency, as follows:

$$IE_{i,t} = \beta_0 + \beta_1 DO_{i,t-1} + \beta_2 DOsq_{i,t-1} + \beta_3 Control_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

**3.5. Model 3: The impact of debt overhang on the investment efficiency under the influence of growth opportunities at the firm-level**

After estimating model (2), we conducted a more in-depth analysis to evaluate the impact of debt overhang on investment efficiency under different growth opportunities. We decided to include the control variable PE (price-to-earnings ratio) in the main model to assess the financial situation and reflect the true value of a company, as well as to represent growth opportunities.

$$IE_{i,t} = \beta_0 + \beta_1 DO_{i,t-1} + \beta_2 PE_{i,t-1} + \beta_3 DOxPE_{i,t-1} + \beta_4 Control_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

Where:

$IE_{i,t}$  represents the dependent variable, indicating the investment efficiency of company  $i$  in year  $t$ .

$DO_{i,t-1}$  represents the independent variable, denoting the debt overhang of company  $i$  in the previous year,  $t-1$ .

$Control_{i,t-1}$  represents control variables included in the model to enhance the robustness of the relationship between the independent variable and the dependent variable. The control variables include:

- $Q_{i,t-1}$ : Lag of Tobin’s Q, measuring the effect of Tobin’s Q of company  $i$ , year  $t-1$ .
- $CF_{i,t-1}$ : Cash Flow of company  $i$  in the previous year,  $t-1$ .
- $STD_{i,t-1}$ : Short-term Debt ratio of company  $i$  in the previous year,  $t-1$ .
- $SIZE_{i,t-1}$ : Firm size of company  $i$  in the previous year,  $t-1$ .
- $SG_{i,t-1}$ : Sales growth of company  $i$ , representing the ability to improve revenue, in the previous year,  $t-1$ .

$DOsq_{i,t-1}$  represents the squared debt overhang, enabling an assessment of the nonlinear relationship between company debt overhang and investment efficiency.

$PE_{i,t-1}$  represents the price-to-earnings variable, which measures the price-to-earnings ratio of a stock.

$DOxPE_{i,t-1}$  is the interaction variable between debt overhang and the price-to-earnings ratio.

**4. RESULTS AND DISCUSSION**

**4.1. Data description**

**Table 4.1. Descriptive Statistics**

Variable	Obs	Mean	Std. Dev.	Min	Max
IE	3053	-.0926	.1152	-.6423	-.0001
DO	1432	-.3105	.405	-1.9815	.1912
DOsq	1432	.2603	.583	0	3.9265
DOxPE	1429	-2.5644	4.7987	-47.0846	10.9828
DO_LargeFirm	1193	-.2985	.3849	-1.9815	.1912
DO_SmallFirm	239	-.37	.4896	-1.9695	.1912
Q	3053	.9302	1.0705	-.9355	3.894

SIZE	3052	27.2019	1.4579	23.6765	29.8822
STD	2568	.3423	.401	0	1
SG	3053	.1839	.457	-.5496	1.9022
CF	3039	.0091	.1109	-.2133	.2777
PE	3047	10.9786	13.4609	-.6028	57.4337
Lev	3053	.4286	.5492	0	2.0862

Source: Summarized by Stata 17.0

The descriptive statistics provide insights into the characteristics of business firms that used debt financing from 2008 to 2021. They present the means and standard deviations of each analyzed variable, illustrating their movement patterns. The table shows that the sample’s investment efficiency has an average value of -0.0926, suggesting relatively high investment efficiency among Vietnamese companies. The debt overhang variable has an average value of -0.3105, which is relatively high, indicating that these companies carry significant financial risks. This value suggests that their debt levels are considerable compared to their income. Furthermore, the firm’s size has an average value of 27.2019, indicating that most of the 508 companies in the sample from 10 industries in Vietnam (at the company level) between 2008 and 2021 have a considerable scale. Regarding short-term debt, the STD variable has an average value of 0.3423, suggesting that companies in Vietnam have a relatively low ratio of short-term debt, preferring not to borrow long-term debt. As for business growth rate, the SG variable has an average value of 0.1839, showing that the growth rate of companies in Vietnam is currently relatively low. The Tobin’s Q ratio, with an average value of 0.9302, indicates that the average value of companies in the group is priced lower than their actual market value, which could pose challenges in raising capital. Lastly, the average value of the leverage ratio for this variable is 0.4286, a relatively high value indicating that companies face significant risks in their investments.

**Table 4.2. Correlation Matrix**

Variables	IE	DO	Q	STD	CF	SG	SIZE
IE	1.0000						
DO	-0.0799	1.0000					
Q	-0.0987	-0.0082	1.0000				
STD	0.1686	-0.0201	-0.0331	1.0000			
CF	-0.0502	0.0391	0.0618	-0.0451	1.0000		
SG	-0.0048	-0.0059	0.0963	-0.0233	0.1342	1.0000	
SIZE	0.0839	-0.0389	0.1921	0.1041	-0.0106	0.0825	1.0000

Source: Synthesized by authors

Table 4.2 presents a correlation matrix examining the relationships between the studied variables in the model. The correlation coefficients show the mutual impact among them.

Firstly, the correlation coefficient between Debt Overhang (DO) and Investment Efficiency (IE) is -0.0799, indicating a weak inverse relationship. Similarly, Sale Growth ratio (SG), Tobin’s Q ratio (Q), and Cash Flow ratio (CF) have correlation coefficients with Investment Efficiency (IE) of -0.0048, -0.0987, and -0.0502, respectively. These coefficients are also weak, but negative, suggesting that as Sale Growth Rate, Tobin’s Q Ratio, and Cash Flow Ratio increase, the Investment Efficiency decreases.

Regarding the variables Debt Maturity (STD) and Company Size (SIZE), their correlation coefficients with Investment Efficiency (IE) are 0.1686 and 0.0839, respectively, indicating a positive relationship. In other words, as Debt Maturity and Company Size increase, the Investment Efficiency also increases.

#### 4.2. Multiple Regression results & Discussion

Based on the results presented in Chapter and quick review regarding previous research, the authors have gained several findings to support the stated prior research, along with some of the evidence that may counter the previous discoveries found in this field.

1. Regression results between investment efficiency and debt overhang, along with other control variables.
2. Regression results between investment efficiency and the square of debt overhang, along with other control variables.
3. Regression results between investment efficiency and debt overhang, along with other control variables, under the influence of business growth opportunities

We employed three different econometric methods, namely Pooled-OLS, Fixed Effect, and Random Effect, to determine the most optimal regression approach. The results indicate that Fixed Effect Model (FEM) is the most suitable method for model regressions.

We employ industry and year fixed effects to eliminate differences across industries and years. This helps ensure the accuracy of data comparison and analysis. By doing so, we can focus on determining the relationship between the independent variable ( debt overhang) and the dependent variable (investment efficiency) without being influenced by these factors' variations. In this research study, we only present the results based on the optimal method's findings.

##### 4.2.1 The impact of Debt Overhang on Investment Efficiency of firms in Vietnam

$$IE_{i,t} = \beta_0 + \beta_1 DO_{i,t-1} + \beta_2 Control_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

The regression results of this model are presented in column (1) of Table 4.3.

Debt Overhang (DO) shows statistically significant negative association with investment efficiency, with a coefficient of -0.0213. This implies that Debt Overhang has a negative impact on the investment efficiency of companies. When the level of debt overhang increases by one unit, the investment efficiency decreases by 0.0213 units. This result is consistent with economic theories and aligns with previous empirical studies conducted by Myers (1977), Kalemli-Özcan (2022), Alexander Popov (2018), and others, as well as the original expectations of this paper.

Previous studies have also highlighted that debt overhang occurs when a company has borrowed too much debt, which can lead to various issues for the company and affect its investment efficiency. Specifically, debt overhang impairs the growth prospects of the company due to debt and interest repayment obligations at the present. Therefore, debt overhang has a significant negative impact on investment efficiency and can affect various aspects of a company's operations. One of the most notable impacts is the increase in borrowing costs. When a company raises capital for investment by debt, the borrowing costs can exceed the potential profits from investment, resulting in a loss of profitability.

In addition, debt overhang also reduces the ability to invest in new projects or expand company operations. When a company is heavily indebted, it lacks necessary resources to pursue new investment opportunities because a significant portion of its cash flow needs to be allocated to servicing current debt, leading to underinvestment.

Another impact of debt overhang is the financial pressure that exerts on a company. If a company is unable to meet its debt obligations, it may face penalties and fees, further damaging its financial situation. In extreme cases, a company may default on its debt, leading to bankruptcy and loss of capital for investors.



This not only harms the company but also the investors and creditors. Therefore, debt overhang can also diminish the reputation and credibility of the company in the views of investors, banks, and customers. In summary, it can be seen that debt overhang has a significantly negative impact on the investment efficiency of the company, highlighting the crucial importance of debt management.

Control variables also have an impact on the investment efficiency of businesses.

The research findings indicate that short-term debt (SDT) positively impacts business investment efficiency with a high level of statistical significance. An increase of 1 unit in short-term debt maturity leads to a 0.0344 unit increase in investment efficiency. Businesses benefit from short-term loans with lower interest costs compared to long-term loans. Utilizing tax shields helps reduce debt repayment pressure. Additionally, businesses can improve their credit rating with credit institutions, accessing low-cost capital for investment projects. Short-term debt offers flexibility, aiding businesses in addressing urgent situations and enhancing negotiation capabilities with stakeholders. Using short-term debt ensures timely payments to stakeholders, strengthening trust and important relationships for business operations. It supports short-term business activities, especially for businesses with clear investment plans and debt control capabilities. Consequently, short-term debt has a positive impact on business investment efficiency.

For the Tobin's Q variable (Q), the results from Table 4.3 show an inverse relationship with the investment efficiency of the company, with a regression coefficient of -0.0094. This means that when Tobin's Q increases by 1 unit, the investment efficiency decreases by 0.0094 units. According to the research of Nguyen Thi Loan, Le Thi Tuyet Hoa, Nguyen Viet Hong Anh (2021), it is also demonstrated that Tobin's Q has a negative impact on the investment efficiency of businesses, especially in situations when investments are below par. This result aligns with the author's study.

However, there are many studies suggesting that a company with a high Tobin's Q ratio is often seen as the market's positive evaluation of the investment opportunities and growth potential of the company, indicating efficient investment. But according to our research findings, this is not always true. A high Tobin's Q does not guarantee that a company is making efficient investments. When Tobin's Q is high, it means that the market value of the company is higher than its actual asset value, which may indicate that the company has invested too much in assets and lacks the necessary capital to optimize the efficiency of those assets. This can lead to suboptimal utilization of assets and a decrease in investment performance. Additionally, sometimes a high Tobin's Q is a result of market speculation. In such cases, companies may focus on increasing their market value through dividend payments, share repurchases, or investing in riskier projects rather than optimizing the use of their existing assets. This can have a negative impact on the investment efficiency of the company. In conclusion, there exists a negative relationship between Tobin's Q and investment efficiency.

Regarding the Firm Size (SIZE), the regression results show a positive impact with a coefficient of 0.0065 on the investment efficiency of businesses with a significance level of 1%. However, these findings are inconsistent with previous studies. The research by Eduardo Borensztein and Lei Sandy Ye (2020) suggests that firm size has a negative impact on the investment activities of businesses. Large companies tend to have wider access to credit markets, including bank loans and bonds, which can lead to excessive borrowing or debt overhang. This, in turn, reduces the investment efficiency of the company. However, this perspective may not be entirely applicable to the conditions of the Vietnamese economy. Specifically, Vietnam is a young and developing economy with numerous opportunities for growth and scale expansion. Therefore, a large firm size can ensure the necessary resources to carry out large investment projects and develop business operations, while also enhancing competitiveness in the market. Thus, in this context, firm size has a positive impact on investment efficiency in Vietnam.

To investigate the impact of scale factors on investment efficiency, we conducted separate regressions for large firms and medium/ small firms. Columns (2) and (3) of Table 4.3 display the relationship between debt overhang and investment efficiency for each group. The scale of firms is determined by the average value of their assets. The results in Table 4.3 indicate that the effect of debt overhang exists in both large firms and medium/small firms. Notably, medium/ small firms show greater sensitivity to debt overhang compared to larger ones. This could be due to asymmetric information between the two groups. Large firms typically possess more comprehensive information about their business, enabling better investment decisions and less impact from debt overhang. On the other hand, medium and small firms may lack resources and reputation to weather economic shocks, making them more affected by debt overhang. These findings underscore the positive impact of the scale factor on investment efficiency in firms.

**Table 4.3. The impact of Debt Overhang on Investment Efficiency at firm-level in Vietnam**

Dependent variable: **Investment Efficiency**

Variables	All (1)	Large Firm (2)	Small Firm (3)
DO	-0.0213*** (-2.89)	-0.0214** (-2.43)	-0.0196 (-1.64)
Q	-0.0094*** (-3.50)	-0.0106*** (-3.59)	0.0017 (0.26)
SIZE	0.0065*** (2.71)	0.0126*** (4.15)	-0.0004 (-0.06)
STD	0.0344*** (4.21)	0.0413*** (4.36)	0.0299* (1.93)
SG	0.0021 (0.33)	0.0022 (0.29)	-0.0054 (-0.44)
CF	-0.0452 (-1.47)	-0.0327 (-0.97)	-0.0665 (-0.85)
_cons	-3.1651 (-3.75)	-0.4958*** (-4.26)	-0.1192 (-0.64)
Industry x Year FE	YES	YES	YES
R <sup>2</sup>	0.0412	0.0554	0.0793
N	1430	1191	239

All independent variables are lagged by 1 year.

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01

Note: The dependent variable is Investment Efficiency. DO represents Debt Overhang. Q is the Tobin's Q coefficient. STD = Short-term Debt/Total Debt. SG is the revenue growth rate. CF represents cash flow. Large enterprises are defined as enterprises with an average asset size greater than 300 billion VND. Fixed Effects Model (FEM) regression is used, controlling for industry and year. The values of t-statistic appear in parentheses.

Source: Synthesized by authors

#### 4.2.2. Nonlinear relationship between Debt Overhang and Investment Efficiency

$$IE_{i,t} = \beta_0 + \beta_1 DO_{i,t-1} + \beta_2 DOsq_{i,t-1} + \beta_3 Control_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

The regression results for a deeper analysis of the nonlinear relationship between debt overhang and investment efficiency are presented in Table 4.4 below. To further examine this issue, we included in Model (2) the variable DO square, which represents the squared Debt Overhang variable (DOsq). The use of DOsq allows us to assess the impact of debt overhang on investment efficiency at different levels. The results in Table 4.4 reveal a nonlinear relationship between debt overhang and investment efficiency of enterprises. Specifically:

For the squared variable DOsq, according to Table 4.4, the regression coefficient for this variable is -0.0292 at a significance level of 5%. Based on this, we can observe that the relationship between the level of debt overhang and investment efficiency is nonlinear, meaning that the impact of debt overhang on investment efficiency is not uniform across all levels. Additionally, under this nonlinear model, we find that the influence of debt overhang on investment efficiency significantly increases as the regression coefficient for DO is -0.0596 at a significance level of 1%. Therefore, it can be seen that after surpassing a certain threshold, the impact of debt overhang on investment becomes substantial. Consequently, in this case, enterprises need to carefully consider and control the issue of debt overhang in order to limit the negative effects on investment efficiency.

To explain this nonlinear relationship, we can refer to Myers' theory (1977) that states as debt levels increase, the conflicts of interest between debtors and creditors become more prominent, as the firm allocates a significant portion of its profits from a project to repay its creditors. This situation creates tighter debt repayment constraints and potential for higher investment reduction.

Based on these results, we conclude that the relationship between debt overhang and investment efficiency is nonlinear. Therefore, it can be inferred that reducing debt overhang may benefit the investment efficiency for the firm, but this impact will not be uniform across all levels of debt overhang and may diminish at a slower rate as debt overhang decreases.

**Table 4.4. Nonlinear relationship between Debt Overhang and Investment Efficiency**

**Dependent variable: Investment Efficiency**

Variables	IE
DO	-0.0596*** (-3.42)
DOsq	-0.0292** (-2.42)
SIZE	0.0054** (2.22)
Q	-0.0096*** (-3.59)
STD	0.0337*** (4.13)
CF	-0.0476 (-1.55)
SG	.00151 (0.23)
_cons	-0.2940*** (-3.47)
Industry x Year FE	YES
R <sup>2</sup>	0.0452
N	1430

All independent variables are lagged by 1 year.

\* p<0.10, \*\* p<0.05, \*\*\* p<0.01

Note: DO is Debt Overhang, DOsq is Debt Overhang squared. Q is Tobin's Q ratio. STD = Short-term debt/Total debt. SG is Revenue growth rate. CF is Cash flow. Fixed effects model regression by industry and year. The t-statistic values appear in parentheses.

Source: Synthesized by authors

#### ***4.2.3. The impact of Investment Efficiency and Debt Overhang, along with other control variables, under the influence of business growth opportunities***

The investment decision depends heavily on the available investment opportunities of a business. Typically, investment opportunities are not observed by economists or in empirical research. They usually rely on a few indicators to represent growth opportunities such as Tobin's Q ratio (Allayannis et al., 2003). However, most representations like Tobin's Q are endogenous or influenced by the local economic conditions or only available for a limited number of listed companies. Therefore, to study the impact of debt overhang and investment efficiency under growth opportunities, this study will rely on an empirical representation - the Price-to-Earnings ratio (PE). In this ratio, a higher PE indicates higher growth opportunities for the business (Bekaert et al., 2007). At the same time, a high PE ratio is an indication that the company continues to invest with expectations of future growth.

Additionally, to control the impact of debt overhang under the influence of growth opportunities, the leverage ratio is an important factor which affects the PE ratio. For example, a company with a high leverage ratio tends to have lower growth opportunities compared to companies with lower leverage ratios. When a company uses high leverage, meaning it utilizes more borrowed assets to invest and expand its business, the company will have to pay more interest and other costs related. This leads to a decrease in the company's profitability and, consequently, a potential decrease in its growth opportunities.

To further investigate the impact of debt overhang on investment efficiency under growth opportunities, the regression results are presented in Table 4.5:

Regarding the impact of Debt Overhang under the influence of Growth Opportunities (DOxPE), the regression results show that the debt overhang has a positive effect on investment efficiency, with a significance level of 10%. Under the influence of growth opportunities, when debt overhang increases by 1 unit, investment efficiency increases by 0.0014 units. This result is consistent with the study of Alexander Popov, Francesca Barbiero, Marcin Wolski (2018). In previous models, without the influence of growth opportunities, the impact of debt overhang on investment efficiency is reversed, meaning that as overinvestment increases, investment efficiency decreases. This contrast can be explained by the profitability of investment opportunities under the influence of growth opportunities. When a company has high growth opportunities, the profitability from investment projects also becomes higher. In this case, if the company borrows a large amount of capital to invest, it can generate significant profits for the company and still have the ability to bear the risks associated with a large amount of debt, such as interest payments and debt repayment. However, this is only true when debt overhang is used to invest in projects that yield high returns. Increasing debt overhang under the influence of growth opportunities can be seen as a form of financial leverage, and using this leverage can benefit the company when investing in projects with higher profitability. However, using leverage can also pose risks to the company, especially when debt overhang is not used to invest in projects that generate high returns, but only to pay off existing debts.

Regarding the Leverage ratio (Lev), the results in Table 4.5 show that the regression coefficient is -0.0851. This indicates that when a company's leverage ratio increases by 1 unit, its investment efficiency decreases by 0.0851 units. In other words, using leverage to invest and expand the business reduces the efficiency of investment projects at a specific rate. This finding aligns with Eduardo Borensztein's study (2020). The explanation lies in the additional costs incurred when a company employs leverage for investment, such as interest payments, financiers' fees, management costs, monitoring expenses, and risks. These costs diminish the profits from investment projects, resulting in decreased investment efficiency. This research finding has implications for investors and asset managers. If the leverage ratio is high, investment projects may not yield high efficiency, and vice versa. Therefore, careful consideration is crucial when deciding to use leverage for investments in a company.

**Table 4.5. The impact of Investment Efficiency and Debt Overhang under the influence of business growth opportunities****Dependent variable: Investment Efficiency**

Variables	IE
DOxPE	0.0014*
	(1.72)
DO	0.0068
	(0.67)
PE	0.0004
	(1.56)
SIZE	0.0016
	(0.69)
STD	0.0211***
	(2.71)
SG	-0.0036
	(-0.60)
CF	-0.0369
	(-1.27)
Lev	-0.0851***
	(-13.82)
_cons	-0.1586*
	(-1.95)
Industry x Year FE	YES
R <sup>2</sup>	0.1501
N	1427

All independent variables are lagged by 1 year.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

*Note:* DOxPE represents Debt Overhang under the influence of growth opportunities, calculated as the product of DO and PE. DO stands for Debt Overhang. PE is the Price-to-Earnings ratio. STD = Short-term Debt/Total Debt. SG is the revenue growth rate. CF represents cash flow. Lev is the leverage ratio, calculated as total debt over total revenue. The regression model is Fixed Effects Model, controlling for industry and year. The t-statistic values are shown in parentheses.

*Source: Synthesized by authors*

From these results, we can conclude that the impact of growth opportunities mitigates the negative influence of debt overhang on the investment efficiency of the company, which aligns perfectly with the hypothesis of the research. Based on this, we will provide recommendations for businesses in Vietnam to control debt overhang in order to achieve optimal efficiency.

## 5. CONCLUSION

The results of the study shows that Debt Overhang has a negative impact on the investment efficiency of companies. The regression results showed that high levels of debt lead to increased borrowing costs, limiting profitability and the ability to invest in new projects or expand operations. Debt overhang can also create financial pressure and damage the company's reputation and credibility. Hypothesis 2 showed that there is a nonlinear relationship between debt overhang and investment efficiency. While moderate levels of debt may have an insignificant effect, surpassing a critical threshold leads to a significant negative impact on investment efficiency. Therefore, companies should carefully control debt overhang to mitigate its adverse effects. For hypothesis 3, growth opportunities can mitigate the negative impact of debt overhang on investment efficiency. Under the effect of growth opportunities, debt overhang positively affects investment efficiency. Companies

use debt overhang to invest in high-profit projects, leveraging financial resources for greater returns. However, if debt overhang is not used for profitable investments but only for debt repayment, it can pose risks. Besides, control variables including Debt Maturity (STD), Firm Size (SIZE), and Tobin’s Q ratio (Q) also influence investment efficiency. The results from the model revealed that the use of short-term debt has a significant positive impact on the investment efficiency of companies. Firm size also positively influences investment efficiency. However, there exists a negative relationship between the Tobin’s Q ratio and investment efficiency. In summary, besides the independent variables, the control variables also have a relatively significant impact on the dependent variable, investment efficiency, at different levels of statistical significance.

The research findings indicate that controlling and managing debt levels is crucial for enhancing investment efficiency and sustainable growth in Vietnamese companies. Regular debt control allows companies to balance borrowing costs and investment returns, while also enabling them to allocate resources towards potential investment opportunities instead of debt repayment. Moreover, using short-term borrowing intelligently can increase investment funding capacity and improve investment efficiency. Short-term debt provides access to low-cost borrowing, offers tax advantages, and helps mitigate risks. However, it’s essential to avoid overreliance on short-term debt to prevent financial strain and hinder business expansion. Additionally, when companies have high-growth prospects, leveraging debt overhang can lead to significant profits and still maintain the ability to manage associated risks. However, careful evaluation and management of debt overhang are necessary to ensure financial stability and enhance investment efficiency. Overall, implementing these recommendations can assist Vietnamese companies in improving investment efficiency, seizing growth opportunities, and achieving sustainable financial performance.

**6. APPENDIX**

**6.1. Appendix 1:**

**Table 1. Regression Model Results for Investment Efficiency**

**Dependent Variable: Capital Expenditure (CE)**

	CE
SG	0.0021 (0.35)
Q	0.0043 (1.60)
CFO	5.35e-14*** (4.58)
Inv	3.18e-10*** (3.54)
Industry x Year FE	YES
Observations	3053
R <sup>2</sup>	0.04

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

*Note:* The dependent variable (CE) is Capital Expenditure in year *t*. SG refers to the sales growth rate, calculated as  $SG = (\text{Revenue in year } (t-1) - \text{Revenue in year } (t-2)) / \text{Revenue in year } (t-2)$ . Q is Tobin’s Q ratio, calculated as the market value in year *(t-1)* divided by the book value of the company in year *(t-1)*. CFO is Cash Flow from Operations in year *t*. Inv is the total investment of the firm in year *t*. The model is estimated using the Fixed Effects Model with industry and year fixed effects. The values of t-statistics are shown in parentheses.

*Source: Regression by Stata 17.0*

**6.2. Appendix 2:****Table 2. Classification of 10 Industries (Based on GICS)**

STT	Industry
1	Basic Materials
2	Consumer Cyclical
3	Consumer Non-Cyclical
4	Energy
5	Financials
6	Healthcare
7	Industrials
8	Real Estate
9	Technology
10	Utilities

Source: By Refinitiv Eikon.

**6.3. Appendix 3:****Table 3. Variance Inflation Factors of variables**

	VIF
DO	1.28
Q	1.10
SIZE	1.28
STD	1.31
CF	1.06
SG	1.07
PE	1.10
Lev	1.53

Note: The VIF (Variance Inflation Factor) results the amount of multi-collinearity in regression analysis used in the study, with industry and year fixed effect model.

Source: Regression by Stata 17.0

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## THE IMPACT OF CORPORATE SOCIAL RESPONSIBILITY ON CORPORATE FINANCIAL PERFORMANCE: EVIDENCE FROM LISTED FIRMS ON VIETNAM STOCK MARKET.

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**ABSTRACT:** *This research provides quantitative evidence of the relationship between social responsibility (CSR) and corporate financial performance of listed corporations in Vietnamese stock markets. Despite the overarching CSR impact on firm performance, CSR is not widely popular and taken into thorough consideration in Vietnam. With a view to providing a deeper insight into this issue, especially CSR in the Vietnamese context, this research uses panel data of 1025 observations, which were collected from 205 companies listed on the Vietnamese stock market between 2016 and 2020. By applying OLS robust regression to examine the relationship between corporate performance and CSR proxies, we came to the conclusion that companies that disclose and practice more CSR activities experience a contradictory reduction in revenue and profitability, which may go against most studies relating to this topic.*

**Keywords:** *Corporate social responsibility (CSR), corporate financial performance, corporate performance, Vietnamese stock market*

### 1. INTRODUCTION

Since there have been little attention to this topic in the Vietnamese economic context, along with the desire to gain a deeper understanding and contribute to a clearer depiction of the relationship between CSR and CFP in the world in general and the Vietnamese market in particular, we decided to study the topic “Effect of corporate responsibility on the financial performance of enterprises listed on the Vietnamese stock market”.

With the outstanding development of science and technology, and the digital transformation of the global economy, social responsibility has gradually become one of the hot topics that businesses are most concerned about today. 20 years ago, when talking about CSR, in general, there were not many businesses in the world that really cared about this aspect. The reason may be that they were not really aware of the benefits that CSR brings. However, in recent years, in the midst of industrialization - modernization, when corporate social responsibility has gradually asserted its value and position, many global corporations and companies, including Vietnam, has implemented innovation and development in the direction of being friendly with nature - society, contributing to portraying the concept of CSR more clearly.

In Vietnam, activities showing social responsibility are not really popular and are often carried out by large companies and corporations, mainly revolving around the volunteer aspect. Two typical enterprises can be mentioned are the Vietnamese dairy company Vinamilk and Vingroup. Their campaigns fund towards the goals of culture - education, community health care, economic support and social security with many charity programs. The publication of information about the above activities has contributed to improving the reputation of the company as well.

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## 2. LITERATURE REVIEW

### 2.1. Literature review

Research on the concept of Corporate Social Responsibility has been known and debated since the 1950s. The ISO 26000 international standard (2010) states that the social responsibility standard includes seven important factors: corporate governance, responsibility to workers, the environment, human rights, transparent organizational management, consumer issues, and contribution to the community. According to Moon and Matten (2004), CSR encompasses the concepts of business ethics, corporate philanthropy, corporate citizenship, sustainability, and environmental responsibility. Companies must perform social responsibilities at four priority levels: economic, legal, ethical, and philanthropic.

In the past, many global studies have been conducted and produced inconsistent results with the following 3 groups of results:

The first group of results shows a positive relationship between CSR and CFP, that is, CSR has a positive impact on CFP, or in other words, when businesses increase declaration and implementation of CSR activities, financial efficiency is increased. business will increase. Research by Okafor et al (2021) has shown that increasing costs for CSR-related activities improves corporate financial performance.

The second group of results shows the negative relationship between CSR and CFP, that is, CSR has a negative impact on CFP, or in other words, when enterprises increase declaration and implementation of CSR activities, financial efficiency is better. This result implies that when businesses implement social responsibility, they will create many additional costs, leading to low operational efficiency. This result is supported by a study by Rhou et al (2016) when this group of authors argued that focusing too much on social responsibility activities can be avoided or should be the responsibility of another party (e.g. government) and can lead to a loss of a company's competitive advantage.

The final group of results shows that there is no relationship between CSR and CFP. This result occurs when researchers cannot conclude whether the relationship is positive or negative, which is found in the study of Moore (2011).

Regarding the impact of CSR information disclosure on business performance in the Vietnamese market, Tién and Anh (2017) showed that CSR information disclosure has a positive impact on the financial performance of enterprises. However, no studies have yet examined the reverse relationship between business performance and CSR in Vietnam. Domestic studies mainly focus on community and environmental aspects of production enterprises. Experimental studies mostly involve case studies of specific companies such as Nguyen Phuong Mai's (2013) study on Dap Cau Company. Nevertheless, there are certain limitations since they are carried out in a specific context of a limited company and do not provide specific solutions.

According to Hồ Thị Vân Anh (2018), there is still a lack of consistency in the empirical research on the relationship between CSR and CFP in the world. Therefore, research on the relationship between CSR and CFP is still necessary and needs to be further expanded to understand the true meaning of CSR, especially in developing countries like Vietnam. This study will examine whether the CSR disclosure index has an impact on the financial performance of companies listed on the Vietnamese stock market, and if so, whether this is a positive or negative relationship. From there, the research will support and provide more grounds for businesses in deciding the level of CSR implementation, helping businesses deal better with the risks of financial performance caused by the level of participation in community supporting activities.

From the research results, the authors expect to provide more bases for economists and business managers in making decisions about the level of CSR disclosure. In addition, the authors also hope that this information can support businesses to identify and deal better with risks related to CFP caused by the level of and disclosure of communal activities participation.

## 2.2. Theoretical background

Stakeholder theory states that a business can only survive if it is able to satisfy the needs of its stakeholders, which significantly affect the well-being of the business. Stakeholders provide resources such as capital, labor, and revenue, thus, they are both potential beneficiaries and bearers of high risk to the corporation (Yoon and Chung, 2018). This theory provides a theoretical basis for research supporting the view that the implementation of CSR can promote corporate development. A donor enterprise that actively carries out community development and social welfare activities will attract the attention of the public, thereby helping to promote the image of the enterprise, build its brand and reputation, and promote long-term development. Furthermore, stakeholder theory also helps to explain competitive interests and the influence of stakeholders on management decisions, henceforth, it has been used to assess the impact on financial performance and strategic planning in business. Financial statements also need to become more reliable, as this is the most accurate tool to report the business situation to shareholders. To ensure the quality of financial statements in widespread use today, GAAP or IFRS should be applied with the aim of improving the completeness, clarity, consistency, and comparability of financial information disclosure.

## 2.2. Hypothesis

A number of studies have found a positive relationship between social responsibility and financial performance, which means that when businesses invest more in CSR, financial performance will increase. To explain this argument, stakeholder theory suggests that the implementation of CSR can promote corporate development. A number of other studies have also confirmed the positive impact of social responsibility on financial performance, such as that of Qiu et al (2020), which tested the role of CSR in terms of protecting the company during the spread of the COVID-19 pandemic. His study provides evidence that CSR engagement is beneficial for improving stock returns as well as increasing stakeholder attention during the pandemic. Based on the above arguments, the authors propose the following research hypothesis:

***H1A: Implementation of social responsibility increases the financial efficiency of the enterprise.***

On the contrary, some studies suggest that disclosure of social responsibility information can increase costs and reduce financial efficiency. Price and Sun (2017) found that companies with a good record of employee welfare have lower leverage. The main reason for this is that CSR activities require financial resources, which can reduce profits and negatively impact CFP in the short term. Some businesses believe that the implementation of CSR is due to pressure from national policies, laws, regulations, and social organizations.

Companies that invest heavily in CSR may overlook other important aspects of their business, such as innovation and cost-cutting, which can negatively affect CFP. Additionally, consumers may not consider CSR activities important enough to justify their costs, leading to lower revenues and profits. However, the negative association between CSR and CFP does not mean businesses completely abandon socially responsible actions. Many managers believe it is important to be an exemplary employee of the company, even if doing so would result in damage to shareholders. Besides, shareholders may require the company to make CSR disclosures even at the cost of poor financial performance. Based on the above arguments, the authors propose the following research hypothesis:

***H1B: Implementation of social responsibility decreases the financial efficiency of the enterprise.***

## 3. METHODOLOGY

### 3.1. Data

Both primary and secondary data were used to analyze the impact of CSR on financial performance. The panel data were established by collecting information from annual reports and financial statements of 205 manufacturing enterprises listed on the Ho Chi Minh Stock Exchange (HOSE) from 2016 to 2020 provided by Vietstock and secondary data from Fiiipro. At the same time, based on market changes and the

appearance of Circular 155/TT-BTC/2015, the authors decided to focus on studying the impact of social responsibility on financial performance in the period 2016 to 2020 to bring more accurate and relevant results to the trend of the times.

**List of information indicators on corporate social responsibility**

Type		Index	Indicators
Environment	Management of raw material	1	Total amount of materials used to manufacture and package the organization's key products and services during the year
		2	Report the percentage of recycled materials used to produce the organization's key products and services
	Energy consumption	3	Direct and indirect energy consumption
		4	Energy saving initiative
	Water consumption	5	Water supply and water usage
		6	Percentage and total amount of recycled and reused water
	Compliance with law on environmental protection	7	Number of times of being fined for not complying with environmental laws and regulations
		8	Total amount due to fines for non-compliance with environmental laws and regulations
Labor	Policies related to employee	9	Total amount due to fines for non-compliance with environmental laws and regulations
		10	Average salary for employees
		11	Labor policy to ensure the health, safety and welfare of employees
		12	Average training hours per year
		13	Continuous learning and skills development programs to support workers with job security and career development. Continuous learning and skills development programs to support workers with job security and career development
Society	Responsibility for local community	14	Community investments and other community development activities, including financial support to serve the community

**3.2. Measurement of corporate social responsibility**

In order to ensure the objectivity of the selection process criteria, the data collection and survey were conducted by the authors in two steps:

Step 1: Collect data from 205 largest listed companies in Vietnam stock market and survey 2016. After the survey, the authors adjust the indicators in accordance with the characteristics and situation. of Vietnam;

Step 2: Based on the agreed criteria, the author group actually surveyed 205 companies with a total of 1025 observation samples within 5 years.

Principle of data collection: The author first reads the financial statements and finds information related to the criteria in the evaluation list. If the enterprise does not disclose the i-th indicator, it shall label it as "0", if the i-th indicator has been published in the general presentation or only with a quantitative presentation, the label shall be "1". After data collection is completed, CSRALL is measured according to the following formula:

$$CSRALL_j = \frac{\sum_i^n X_{ij}}{14}$$

CSRALL is CSR disclosure score for j<sup>th</sup> company

X<sub>ij</sub> = 1 if i<sup>th</sup> activity is not disclosed in the general presentation or only with a quantitative presentation;

X<sub>ij</sub> = 0 if i<sup>th</sup> activity is not disclosed.

### 3.3. Control variables

After referring to previous studies, the authors have controlled for fixed effects by industry and year by using 2 dummy variables year, industry to compare the difference between industries and the past years. Besides, the group also uses some other control variables in the model as follows: Board independence (*Baysinger and Butler, 1985*); Board ownership (*Short and Keasey, 1998 & Cui and Mark, 2003*); Manager ownership (*Duc Hong Vo and Tri Minh Nguyen, 2014*); CEO duality (*Richer and Dalton, 1991; Boyd, 1995*), Board size (*B. Xie et al, 2003*); Firm size (*Glaum et al, 2004; Kim et al 1976; Pham Nguyen Dinh Tuan, 2020*); Leverage (*Pham Nguyen Dinh Tuan, 2020*); Asset turn (*Duc Hong Vo and Tri Minh Nguyen, 2014*).

### 3.4. Research model

Based on the above theoretical bases, the aim of this study is to explore the impact of CSR and CFP, and to examine the moderating effect of ownership structure between both variables to understand how firms control the relationship between CSR and CFP through their ownership structure. The study also focuses on aspects of corporate social responsibility, including the level of interest, declaration and implementation of activities related to social responsibility. Therefore, the research team offers a quantitative model to clarify the relationship between CSR and CFP as follows:

$$ROA_{i,t} = \alpha_0 + \alpha_1 CSRALL_{i,t} + \alpha_2 CONTROL_{i,t} + \epsilon_{i,t}$$

$$ROE_{i,t} = \alpha_0 + \alpha_1 CSRALL_{i,t} + \alpha_2 CONTROL_{i,t} + \epsilon_{i,t}$$

#### *Bảng giải thích biến trong mô hình*

Variables	Definition	Measurement	Expectation	Studie
<b>DEPENDENT VARIABLES</b>				
ROA	Return on assets	Ratio of net income to total assets		Okafor et al. (2021)
ROE	Return on equity	Ratio of net income to total shareholders' equity		Okafor et al. (2021)
<b>INDEPENDENT VARIABLES</b>				
CSRALL	Disclosure of social responsibility	Select "1" if there is a declaration of social responsibility and "0" for other cases	+	Rui Ang et al., (2021)
<b>CONTROL VARIABLES</b>				
BOARD_IND	Proportion of independent members of the Board of Directors	Number of independent member/ Total member of Board of Directors	-	Baysinger và Butler (1985)
OWN BOARD	Ownership of the Board of Directors	Percentage of shares owned by the Board of Directors/ Total number of shares outstanding	+	Short and Keasey (1998), Cui and Mark (2003)
OWN MNG	Ownership of the Manager	Percentage of shares owned by the Manager /Total number of shares outstanding	+	Duc Hong Vo & Tri Minh Nguyen (2014)
DUAL	The duality of the CEO	Select "1" if the CEO is also the chairman and "0" for other cases	-	Richer and Dalton (1991), Baliga, Moyer and Rao (1996)
BOARD SIZE	Board size	Natural logarithm of the total number of board members	+	Essa et al., (2016), Huy (2016).
FIRM SIZE	Firm size	Natural logarithm of the total assets of the firm	+	Glaumet al., (2004), Pham Nguyen Dinh Tuan (2020)
LEV	Financial leverage	Total debt/Total assets of the business	-	Pham Nguyen Dinh Tuan (2020)
ASSET TURN	Asset turn	Total net revenue/Total assets of the business	+	Duc Hong Vo & Tri Minh Nguyen (2014)

## 4. RESULTS

### 4.1. Descriptive statistics

With 935 observations obtained in the period of 2016 - 2020, Table 1 illustrates the descriptive statistics of independent and dependent variables. Nine independent variables are CSRALL (CSR score), BOARD\_SIZE (board size), BOARD\_IND (board independence), DUAL (CEO duality), OWN\_MNG (ownership of manager), OWN\_BOARD (board ownership), ASSET\_TURN (asset turnover), LEV (leverage) and FIRM\_SIZE (firm size) while dependent variables are ROA (return on asset) and ROE (Return on equity). CSR has the mean score of 0.492 with a standard deviation of 0.275. In the selected time period, the mean of return on asset is 0.063 with the range running from -0.094 to 0.377. Similarly, the mean value of return on equity is 0.121 along with the minimum and maximum values of -0.251 and 0.505 respectively for the sample obtained.

**Table 1: Summary of descriptive statistics**

Variable	Obs	Mean	Std.Dev	Min	Max
ROA	1025	0.063	0.071	-0.094	0.377
ROE	1025	0.121	0.11	-0.251	0.505
CSRALL	1025	0.492	0.275	0	1
BOARD_IND	935	0.549	0.247	0	1
DUAL	935	0.193	0.394	0	1
OWN_MNG	935	0.071	0.116	0	0.765
OWN_BOARD	935	0.093	0.144	0	0.81
BOARD_SIZE	935	5.448	1.231	3	11
LEV	1025	0.484	0.233	0.031	0.942
ASSET_TURN	1025	0.832	0.823	0	4.712
FIRM_SIZE	1025	28.482	1.78	23.95	34.955

*Note: ROA: Return on asset; ROE: Return on equity, CSRALL: CSR score, BOARD\_IND: board independent; DUAL: CEO duality; OWN\_MNG: Ownership of manager; OWN\_BOARD: board ownership, BOARD\_SIZE: board size; LEV: leverage; ASSET\_TURN: asset turnover; FIRM\_SIZE: firm size.*

### 4.2. Correlation analysis

Table 2 shows the two-tailed test correlation including the correlation coefficients and the statistical significance of various variables. The Pearson correlation test is conducted with a total of 11 variables.

**Table 2: Correlation analysis**

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) ROE	1.000										
(2) ROA	0.834***	1.000									
(3) CSRALL	-0.063**	-0.089***	1.000								
(4) BOARD_SIZE	0.014	0.026	0.050	1.000							
(5) BOARD_IND	-0.140***	-0.099***	-0.025	0.112***	1.000						
(6) DUAL	-0.002	0.000	-0.006	-0.041	-0.095***	1.000					

(7) OWN_MNG	0.022	-0.002	-0.003	-0.086***	-0.012	0.361***	1.000				
(8) OWN_BOARD	0.104***	0.105***	-0.069**	-0.063*	-0.198***	0.273***	0.557***	1.000			
(9) ASSET_TURN	0.245***	0.228***	0.044	0.089***	-0.015	-0.009	-0.012	0.028	1.000		
(10) LEV	-0.031	-0.440***	0.040	-0.050	-0.025	-0.074**	0.040	0.024	-0.055*	1.000	
(11) FIRM_SIZE	-0.010	-0.247***	0.029	-0.062*	-0.001	0.015	0.078**	0.004	-0.307***	0.539***	1.000

Note: ROA: Return on asset; ROE: Return on equity, CSRALL: CSR score, BOARD\_IND: board independent; DUAL: CEO duality; OWN\_MNG: Ownership of manager; OWN\_BOARD: board ownership, BOARD\_SIZE: board size; LEV: leverage; ASSET\_TURN: asset turnover; FIRM\_SIZE: firm size.

Gujarati et al. (1995) noted that regression analysis can be inefficient due to two major issues: multicollinearity and homoscedasticity. To address these problems, the Variance Inflation Factor (VIF) and the Breusch-Pagan-Godfrey test were conducted, respectively. The results presented in Table 3 indicate that most independent variables have a VIF of under 2.0, with the exception of board independence and board ownership. Although these two variables have VIF values of 2.233 and 2.016, respectively, the difference between their values and the accepted level of 2.0 is not significant and can be considered acceptable. Therefore, multicollinearity does not appear to be a serious issue in the two models.

**Table 3: Testing for multicollinearity by using the variance inflation factor (VIF)**

VARIABLE	VIF-ROA	VIF-ROE
CSRALL	1.115	1.115
BOARD_IND	2.233	2.233
DUAL	1.241	1.241
OWN_MNG	1.971	1.971
OWN_BOARD	2.016	2.016
ASSET_TURN	1.165	1.165
LEV	1.485	1.485
BOARD_SIZE	1.043	1.043
FIRMSIZE	1.677	1.677
Mean	1.727	1.727

Note: ROA: Return on asset; ROE: Return on equity, CSRALL: CSR score, BOARD\_IND: board independent; DUAL: CEO duality; OWN\_MNG: Ownership of manager; OWN\_BOARD: board ownership, BOARD\_SIZE: board size; LEV: leverage; ASSET\_TURN: asset turnover; FIRM\_SIZE: firm size.

On using Breusch–Pagan test, as observed in table 4, the presence of heteroscedasticity across two models was confirmed as Prob > Chi square equals to 0,0000, which is lower than 0.005. Hence, robust standard errors were applied to provide a better fit for these models.

**Table 4: Breusch - Pagan test of heteroscedasticity**

Result	Model (1) - ROA	Model (2) - ROE
Chi square	303.82	11.14
Prob > chi square	0,0000	0,0000

**4.3. Discussion**

**Table 4: Regression result**

Variable	Model (1) ROA - robust	Model (2) ROE - robust
CSRALL	-0.0171**	-0.0252**
BOARD_SIZE	0.0002	0.0012
BOARD_IND	-0.0275**	-0.0506***
DUAL	-0.0118**	-0.0145
OWN_MNG	-0.0171	-0.0123
OWN_BOARD	0.0455*	0.0564
ASSET_TURN	0.0183***	0.0342***
LEV	-0.1388***	-0.0434**
FIRM_SIZE	0.0028**	0.0072***
Constant	0.0576	-0.0668
Fixed year effect	yes	yes
Fixed industry effect	yes	yes
Observations	935	935
R-squared	0,2667	0,1076
Adjusted R-squared	0,2516	0,0887

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

*Note: ROA: Return on asset; ROE: Return on equity, CSRALL: CSR score, BOARD\_IND: board independent; DUAL: CEO duality; OWN\_MNG: Ownership of manager; OWN\_BOARD: board ownership, BOARD\_SIZE: board size; LEV: leverage; ASSET\_TURN: asset turnover; FIRM\_SIZE: firm size.*

The variable CSRALL represents the level of concern, disclosure, and implementation of corporate social responsibility. With a significant negative regression coefficient at the 5% significance level, the obtained result contradicts the initial expectation of the authors under hypothesis **H1A: Implementation of social responsibility increases the financial efficiency of the enterprise**. In a study on the relationship between CSR and financial performance in China, Rui Ang et al. (2021) found a positive correlation between social responsibility and the financial efficiency of companies. Similarly, in the United States, Okafor et al. (2021) demonstrated that CSR has a positive correlation with ROA and ROE, meaning that the higher a company’s level of concern, publicity, and application of social responsibility, the more efficient its operations. However, the results regarding the inverse relationship between CSR and financial indicators also revealed many surprising and interesting points. Accordingly, this research findings are reinforced by studies conducted by Sekhon et al. (2019) and Buallay et al. (2019), which both show a negative correlation between CSR and ROA, ROE. Sekhon et al. (2019) believe that companies that implement social



responsibility will bear direct costs, resulting in many disadvantages compared to competing companies in the same industry. This seriously affects the value provided to company shareholders. Meanwhile, Buallay et al. (2019) affirm that publicly disclosing social responsibility has a negative impact on operational and market performance but does not affect financial performance. In their study, Buallay et al. (2019) point out that investors evaluate the ability to implement social responsibility based on whether or not companies declare relevant actions. Specifically, issuing any related reports not only increases the effectiveness of social responsibility but also improves the expected value of related activities. Therefore, they consider this to be an important result as it explains the complexity of previous studies on the issue.

Many control variables, such as board independence (BOARD\_IND), CEO duality (DUAL), and leverage (LEV), have a significant negative impact on corporate financial performance, meeting the initial expectations with a significance level of at least 5%. On the other hand, asset turnover (ASSET\_TURN) and firm size (FIRM\_SIZE) are significant, indicating a strong relationship between them and ROA and ROE. These findings are consistent with previous research conducted by Sekhon et al. (2019). However, board size (BOARD\_SIZE), ownership of manager (OWN\_MNG), and board ownership (OWN\_BOARD) are either insignificant or significant at a low level of 10%, suggesting that their effects on corporate performance are minor or non-existent.

## 5. CONCLUSION

From the theoretical bases mentioned, including agent theory, shareholder theory, stakeholder theory, to analyze the relationship between the level of enforcement and disclosure of social responsibility to the effectiveness of Financial results, the study has measured and tested: the degree of social responsibility disclosure, the ratio of the number of independent members of the Board of Directors, the ownership of the Board of Directors, the ownership of the Management, the duality CEO, and finally asset turnover. Applying the above theories and using a processed data set consisting of 1025 observations from 205 non-financial listed companies published through the annual report for the period 2016-2020, it resulted in a negative relationship between CSR disclosure and financial performance. With their research results, the team has identified variables that have an impact and some are not significant on financial performance.

In this study, the overall level of CSR disclosure has been shown to have a negative impact on financial performance, i.e. the more CSR is enforced and disclosed, the lower the financial performance. Accordingly, the research results of the authors were reinforced by the study of Sekhon et al. (2019), the study of Buallay et al (2019) when both showed a negative correlation between CSR and ROA, ROE. This can be explained that the performance and business results of enterprises are greatly influenced by the behavior of profit management. Therefore, enterprises need to try to improve and enhance the quality of their internal management to ensure the correctness of the managers' influence on the financial performance of the company. Regarding individual investors, the group whose majority lack in-depth knowledge of the market, it is advisable that they learn more about the internals of businesses through various information channels such as publications, newspapers with guaranteed quality and reputation in the financial field, or articles from reputable market analysts. For shareholders of enterprises - large investors who aim for long-term investment, this group of investors should closely monitor and control the structure and quality of the Board of Directors to minimize the risks of representatives-related issues.

## 6. LIMITATIONS

Despite important theoretical and experimental contributions, the study still has some limitations in three aspects: time and information quality, space and data analysis method. Firstly, the data set is collected

and processed by the research team from annual reports and financial statements of 205 enterprises from 2016 to 2020. This is a limited time period and the quality of information remains. The shortage leads to the existence of quite a lot of blank data, reducing the number of research samples of the topic. Secondly, in terms of space, the study was conducted with only 1025 observations, all of which are listed on the Ho Chi Minh Stock Exchange (HOSE). Third, in terms of data analysis methods, the study only uses performance indicators based on accounting measures to measure the relationship between CSR and CFP. Hence, future research is recommended to overcome these shortcomings to present a better picture of this phenomenon.

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## DOES CSP MATTER FOR FIRM'S STOCK LIQUIDITY IN EMERGING COUNTRIES?

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**ABSTRACT:** *The objective of this study is to investigate the influence of Corporate Social Performance (CSP) activities on the stock liquidity of firms in emerging nations. Utilizing a panel analysis of data collected from six emerging nations from the year 2002 to 2016, I demonstrate the main research hypothesis that CSP initiatives have a negative effect on the stock liquidity implying that CSP investment could place a significant financial strain on businesses in these countries. Furthermore, the empirical results also indicate that different elements of CSP have varying levels of effect on firm financial performance. For instance, while governance activities have the greatest impact, the result of environmental scores is irrelevant. These primary findings are supported by numerous robustness tests. Interestingly, the adverse association between CSP and stock liquidity is mitigated in countries with strong institutional environments.*

**Keywords:** *Corporate Social Performance (CSP); stock liquidity; ESG score; emerging countries, institutional environments.*

### 1. INTRODUCTION

Recent years have witnessed the emergence of CSP investment as a global economic trend, particularly in wealthy nations. The firm must take into account a variety of other aspects, consisting of expenses, resources, and other considerations, meaning this is not a simple decision for them to make. In developing nations, where industrialization tends to be associated with environmental destruction, implementing CSP activities into their business processes creates even more hurdles and difficulties. They must determine whether investing in CSP initiatives will have the desired impact on the company's financial performance because the sustainability issues may occasionally be costly for businesses but beneficial for society as a whole (Nguyen et al., 2021). For these reasons, I suppose that it is important to investigate the influence of CSP practices on stock liquidity particularly in the developing markets for the purpose of offering a theoretical basis for firms in making investment decisions.

While the nexus between CSP and corporate performance has been the subject of much discussion over the years, there is limited evidence to investigate either the processes or the impact of sustainable activities on stock liquidity of firms in the developing countries (Zhang & Zhang, 2021; Egginton & McBrayer, 2018). As a result, I conduct a global study across emerging economies that permit me to explore the bottom line which is the association between CSP and firms' stock liquidity.

I expect that CSP will have an intensive influence on a firm's stock liquidity by investigating both the positive and negative aspects of this association in order to find out which is more relevant in developing nations. At the country-level, I have found external control mechanisms influencing this correlation, called institutional environments, and I anticipate that the negative impact of CSP on liquidity can be reduced thanks to the strength of the institutional settings.

Using a cross-country panel dataset of publicly listed companies from 06 emerging countries between 2002 and 2016 obtained from Datastream to test the hypotheses, the study suggests that, due to the increase

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in firm costs and challenges regarding emerging markets, CSP initiatives have a significant and adverse impact on the firm stock liquidity. Furthermore, powerful institutional environments, characterized by the presence of six macro-level institutional indexes, have the tendency to alleviate the negative correlation between CSP and stock liquidity.

This study implies three key contributions including academic and practical impacts to literature. First and foremost, this one enriches the financial literature on whether it is worthwhile for firms with demand to invest in CSP by determining the influence of them through a niche approach, stock liquidity, rather than the overall approach, firm financial performance, like most of previous studies. In addition, instead of using samples in developed countries, I decided to conduct the research in emerging countries where CSP initiatives investment is still a mystery. More intriguing, this research also emphasizes the critical role of institutional environments in the correlation of CSP and stock liquidity.

The remaining of my research is organized as follows. Section 2 reviews the relevant literature followed by outlining two primary hypotheses. The variable construction, data, and sample are described in section 3. Section 4 explains the methodology while section 5 reports the results. Section 6 concludes the study.

## **2. LITERATURE REVIEWS AND HYPOTHESIS DEVELOPMENT**

### **2.1. CSP and stock liquidity**

Previous studies argue that an essential component in affecting a firm's equity liquidity is its information environment (Healy & Palepu, 2001; Ravi & Hong, 2014). In detail, enterprises whose corporate announcements are better disclosure and transparency might minimize the problem caused by asymmetric information and accordingly experience a higher level of stock liquidity, and vice versa (Kurlat, 2018). This result holds true for both required and voluntary CSP disclosure as long as the disclosure is valuable (Dhaliwal et al., 2011).

Moreover, reputation plays an important role in helping increase the liquidity in a firm's stock by reducing adverse selection and moral hazard issues (Battalio et al., 2007) as well as strengthening the trust and admiration of stakeholders to firms (Bai & Ho, 2022). A variety of works (Fombrun & Shanley, 1990; Karl V. Lins, 2017) examine how investing in social and sustainability activities may increase social capital as well as firms' reputation in the public and the community in which they function, which is consistent with Sacconi & Antoni, 2011's conclusions. In line with all of these research, I propose the following hypothesis:

***H1a: CSP engagement is positively related to the stock liquidity of firms in the emerging countries.***

When investing in CSP initiatives, huge costs are needed to cut emissions or improve the use of natural resources (Rassier and Earnhart, 2010). Some businesses have to convert from their own outdated technologies into environmentally friendly ones in their production processes (Bansal & Clelland, 2004), leading to a quite high investment in their expenses. If these practices dramatically raise the costs without yielding desired outcomes, it will degrade the company's financial performance and increase the stock illiquidity of the firm accordingly. Furthermore, because costs associated with strengthening CSP are not frequently reflected exactly in the financial performance of a firm (Duque-Grisales & Aguilera-Caracuel, 2019), CSP is also consider as a sign of managerial agency issues that worsen information asymmetry and reduce firm's stock liquidity, as a consequence (Bénabou & Tirole, 2010).

Besides, CSP investment is not highly concerned in the emerging market. Therefore, the businesses have not yet won over their stakeholders' and society's overall trust and loyalty despite initiatives on social issues being developed (Marquis & Raynard, 2015). In comparison with developed markets which already have a strong CSP foundation, emerging market firms confront more uncertainties and difficulties

in pursuing extensive CSP initiatives. The existence of institutional voids (eg. Marquis & Raynard, 2015; Rottig, 2016), instability in politics, corruption, working conditions, the effects of climate change (Clark et al., 2015) as well as limited corporate transparency in organizational cultures and business rules are some of primary reasons leading to risks when opting to invest in CSP, and is a key factor deciding the illiquidity in their stock. These reasons led me to an alternative hypothesis to H1a as follow:

*H1b: CSP engagement is negatively related to the stock liquidity of firms in the emerging countries.*

## **2.2. The impact of institutional environments**

Institutional contexts are seen as an external method to resolve agency issues (Bai & Ho, 2022), which are frequently positioned beyond the supervision of enterprises and are much cheaper control measures than internal ones. The relationship between CSP and stock liquidity might be strengthened or weakened by institutional environments.

According to previous study results (eg., Porta et al., 2006; Roy et al., 2022), the powerful institutional environments can improve financial market efficiency, offer more effective enforcement mechanisms and more transparent data, as well as safeguard creditors and investors; firms operating in these countries can benefit from lower transaction costs, less asymmetric information, and a greater level of liquidity. Consequently, I highly expect that institutional context might mitigate the negative correlation between CSP and liquidity:

*H2: The negative impacts of CSP to stock liquidity of firms is less pronounced in nations which have strong institutional environments.*

## **3. VARIABLES AND DATA SAMPLE**

### **3.1. Variable construction**

In this study, I employ Turnover as the primary proxy to measure LIQ, followed by Amihud illiquidity to test the robustness of my findings. Stock turnover (Turny) is defined as the annual average number of shares traded on a day divided by the entire number of shares outstanding (eg. Berkman & Nguyen, 2010; Datar et al., 1998). Turnover ought to be negatively correlated with spread and positively correlated with liquidity. Amihud (2002) illiquidity indicator is defined as the annual average ratio of the daily absolute stock return divided by the dollar value of volume, reflecting the price impact of order flow or the price change linked to trading volume. To provide a liquidity proxy in order to make the results simpler to interpret, I multiply the Amihud illiquidity measure by (-1) in the regression model.

Next, I make use of ESG performance assessments from the Thomson Reuters ESG database to quantify CSP. Thomson Reuters creates ESG scores from this pool of data that reflect a company's ESG performance in three categories (environment (E), social (S), and governance (G) and ten fields.

I implemented a set of control variables at firm-level in this research, which are firm size (SIZE), profitability (PROF), depreciation (DEP), market-to-book value (MTB), research and development expenses (RD), research and development expenses dummy (RDDUM), tangibility (TANG) and leverage ratio (LEV).

### **3.2. Data and samples**

I gathered information from a variety of sources through four stages in total. Firstly, I used the Datastream database to obtain annual firm-level accounting data from Worldscope. Secondly, I gathered daily data from Worldscope like share prices, stock returns, and trading volumes. Thirdly, ESG factor information from the Thomson Reuters ESG database is obtained. Lastly, I relied on the works of Djankov et al. (2003); Porta et al. (2006), Djankov et al. (2008), Porta et al. (1998) and Gao & Zhu (2015) to

obtain six macro-level institutional index. After using some filters, the final sample included 757 firm-year observations from 06 different countries including China, Indonesia, Malaysia, Philippines, South Korea, and Turkey, from 2002 to 2016. I also winsorized both the dependent and independent variables at the 1st and 99th percentiles to eliminate the outliers.

#### 4. METHODOLOGY

The subsequent baseline regression to investigate the relationship between CSP and stock liquidity (LIQ) is:

$$LIQ_{i,j,t} = \alpha_0 + \beta CSP_{i,j,t} + Control\ variables_{i,j,t} + y_{t,j} + \mu_{i,j,t}$$

Beyond the basic link, I additionally design another equation below to find evidence for the debated question of how institutional settings (INSENV) affect the association between CSP and the stock liquidity (LIQ):

$$LIQ_{i,j,t} = \alpha_0 + \beta_1 CSP_{i,j,t} + \beta_2 INSENV_{j,t} + \beta_3 (CSP_{i,j,t}) * (INSENV_{j,t}) + Control\ variables_{i,j,t} + y_{t,j} + \mu_{i,j,t}$$

#### 5. EMPIRICAL RESULTS

##### 5.1. Descriptive statistics

We report the descriptive statistics in Table 1. The mean of ESG score is 50.1212 and ENV score witnesses the highest mean score in three pillars of ESG, at 59.0919. Besides, the mean scores of Turny and Amihudy which are employed in the sample to proxy for LIQ are 4.9582 and 0.0008 respectively. They are consistent with previous studies in the same stream of research (e.g., Duque-Grisales & Aguilera-Caracuel, 2019; Bai & Ho, 2022).

**Table 1. Summary statistics**

The summary statistics for the full sample are reported in Table 5.1. The variable definitions are in Appendix A.

	Mean	Median	SD	Min	Max
ESG score	50.1212	51.4700	20.2066	9.3800	90.0900
ENV score	59.0919	67.1100	31.4237	9.4800	96.9700
CGV score	21.2280	14.7600	20.4152	1.3500	93.6800
SOC score	56.2174	61.6700	32.1961	4.3500	98.6900
TURNY	4.9582	3.5397	5.1957	0.0617	50.6842
AMIHUDY	0.0008	0.0000	0.0115	0.0000	0.3139
SIZE	15.9317	15.9188	1.2850	12.7851	19.7941
PROF	0.1263	0.1098	0.0963	-0.2693	0.8701
DEP	0.0407	0.0307	0.0351	0.0015	0.3313
MTB	2.2928	1.6000	2.9000	-4.8200	29.2100
TANG	0.3748	0.3710	0.1823	0.0361	0.8493
RD	0.0129	0.0043	0.0244	0.0000	0.3235
RDDUM	0.9406	1.0000	0.2366	0.0000	1.0000
LEV	0.2450	0.2420	0.1530	0.0000	0.8322

Table 2 reports the correlation coefficient. It shows that most correlation coefficients are quite low with the exception of the strong connection of the ESG, ENV, SOC, and CGV scores with each other. Multicollinearity is therefore unlikely to be an important limitation in my regression study.

**Table 2. Correlation coefficients**

This table provides the Pearson correlation coefficients between the primary analyses’ explanatory variables. Stars imply significance at the 5% level. The variable definitions are in Appendix A.

	ESG score	ENV score	CGV score	SOC score	TURNY	AMIHUDY	SIZE
ESG score	1						
ENV score	0.8222*	1					
CGV score	0.4281*	0.3198*	1				
SOC score	0.8831*	0.8532*	0.4365*	1			
TURNY	-0.0981*	-0.0220	-0.2363*	-0.1114*	1		
AMIHUDY	0.0225	-0.0372	0.1000*	0.0371	-0.0541	1	
SIZE	0.4065*	0.3944*	0.2312*	0.3516*	-0.0457	-0.1115*	1
PROF	0.0104	-0.0375	0.1163*	0.0480	-0.2112*	0.0117	-0.3323*
DEP	0.2279*	0.2173*	0.2106*	0.2414*	0.0222	0.1086*	0.0820
MTB	-0.0224	-0.0578	0.1110*	-0.0047	-0.0906	-0.0058	-0.2464*
TANG	0.0923	0.0299	0.1265*	0.0721	-0.1049*	-0.0152	0.0692
RD	0.1169*	0.1038*	-0.0466	0.0661	0.1609*	-0.0219	-0.0737
RDDUM	0.0479	0.1687*	-0.1322*	0.0428	0.1585*	-0.0460	0.1473*
LEV	0.1215*	0.1445*	0.0726	0.0811	0.1758*	-0.0076	0.3000*
	PROF	DEP	MTB	TANG	RD	RDDUM	LEV
PROF	1						
DEP	0.4245*	1					
MTB	0.5132*	0.2937*	1				
TANG	0.1694*	0.4450*	-0.0062	1			
RD	0.0643	0.1729*	0.0154	-0.1470*	1		
RDDUM	-0.2062*	-0.0823	-0.2781*	-0.0037	0.1336*	1	
LEV	-0.4043*	0.0684	-0.0974*	0.1571*	-0.1574*	0.0643	1

**5.2. CSP initiatives and firm’s stock liquidity**

Based on Table 3 that shows the baseline result, I note that except the environment performance which does not lead to any correlation between CSP and the stock liquidity, all remaining significant and negative coefficients of ESG on Turny lead to the conclusion that there is an adverse correlation of CSP investment on the firm’s stock liquidity. These findings prove that the ESG index as a whole has particular negative implications on the liquidity of a firm’s stock, which are consistent with my hypothesis H1b regarding the presence of a negative correlation between the CSP and firm’s stock liquidity.

**Table 3. CSP and stock liquidity – baseline regression results.**

The baseline regression findings regarding the effect of CSP on stock market liquidity are presented in this table. Turny serves as the proxy for LIQ. ESG and E, S, G scores are the proxies for CSP. Firm characteristics are included in control variables. The values \*\*\*, \*\*, and \*, respectively, show significance at 1%, 5%, and 10% levels, in turns. T-statistics are provided in parenthesis. The variable definitions are in Appendix A.

	(1)	(2)	(3)	(4)
VARIABLES	Turny	Turny	Turny	Turny



ESG100	-2.4926**			
	(0.9710)			
ENV100		-0.7892		
		(0.6276)		
SOC100			-1.6012***	
			(0.5953)	
CGV100				-4.6246***
				(0.9000)
SIZE	-0.6379***	-0.7366***	-0.6564***	-0.5983***
	(0.1669)	(0.1642)	(0.1631)	(0.1563)
PROF	-14.9701***	-15.4484***	-14.8838***	-14.2935***
	(2.7132)	(2.7156)	(2.7142)	(2.6762)
DEP	29.1648***	28.7806***	30.0358***	29.9327***
	(6.6653)	(6.7440)	(6.6992)	(6.5609)
MTB	0.0047	0.0051	0.0030	0.0149
	(0.0399)	(0.0400)	(0.0399)	(0.0394)
RD	30.4700***	28.6221***	28.8124***	27.0336***
	(7.8090)	(7.7915)	(7.7519)	(7.6501)
RDDUM	2.5764***	2.7166***	2.6064***	2.1642***
	(0.7875)	(0.7959)	(0.7871)	(0.7817)
TANG	-3.7829***	-3.9023***	-3.9234***	-3.5968***
	(1.1225)	(1.1318)	(1.1236)	(1.1083)
LEV	5.2598***	5.1925***	5.1635***	5.3007***
	(1.3448)	(1.3508)	(1.3427)	(1.3260)
Constant	13.4749***	14.2716***	13.1971***	12.3960***
	(4.4528)	(4.4845)	(4.4628)	(4.3754)
Observations	757	757	757	757
R-squared	0.1971	0.1917	0.1978	0.2180
Year FE	YES	YES	YES	YES

### 5.3. Robustness tests

#### 5.3.1. Alternative proxy of liquidity

I check the robustness of the baseline results using an alternative proxy of liquidity, named Amihud illiquidity indicator. As shown in Table 4, the coefficient on CSP is negative and significant at 1 % level, indicating that there is a negative relationship between CSP and stock liquidity. This supports my main finding.

**Table 4. The robustness check – alternative proxy of liquidity**

The table shows the regression findings for equation (4). Stock liquidity (LIQ), also known as the dependent variable, represented by Amihudy. ESG and E, S, G scores are the proxies for CSP. Firm characteristics are included in control variables. The values \*\*\*, \*\*, and \*, in turn, show significance at 1%, 5%, and 10% levels. T-statistics are provided in parenthesis. The variable definitions are in Appendix A.

	(1)	(2)	(3)	(4)
VARIABLES	Amihudy	Amihudy	Amihudy	Amihudy
ESG100	-0.0042*			
	(0.0023)			

ENV100		0.0008		
		(0.0015)		
SOC100			-0.0024*	
			(0.0014)	
CGV100				-0.0077***
				(0.0022)
SIZE	0.0019***	0.0015***	0.0018***	0.0019***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)
PROF	0.0115*	0.0099	0.0115*	0.0126*
	(0.0065)	(0.0065)	(0.0065)	(0.0065)
DEP	-0.0788***	-0.0833***	-0.0779***	-0.0776***
	(0.0160)	(0.0162)	(0.0161)	(0.0159)
MTB	0.0002*	0.0002**	0.0002*	0.0002**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
RD	0.0461**	0.0413**	0.0431**	0.0403**
	(0.0187)	(0.0187)	(0.0186)	(0.0185)
RDDUM	0.0019	0.0018	0.0019	0.0012
	(0.0019)	(0.0019)	(0.0019)	(0.0019)
TANG	0.0070***	0.0072***	0.0068**	0.0073***
	(0.0027)	(0.0027)	(0.0027)	(0.0027)
LEV	0.0011	0.0007	0.0009	0.0012
	(0.0032)	(0.0032)	(0.0032)	(0.0032)
Constant	-0.0348***	-0.0307***	-0.0349***	-0.0366***
	(0.0107)	(0.0107)	(0.0107)	(0.0106)
Observations	757	757	757	757
R-squared	0.0617	0.0580	0.0611	0.0733
Year FE	YES	YES	YES	YES

### 5.3.2. Alternative methodology

I employ an alternative methodology that is the two-step system GMM to deal with endogeneity issues. In this model, the lags of the dependent variables are used as explanatory variables, which means that lagged values of CSP are used as instruments for managing this endogenous association. Indeed, it may not be the CSP practices used this year that are having an impact on stock liquidity, but rather the choices made the year before. The results are reported in Table 5. I find that the coefficients of CSP proxies are significant and negative, supporting the baseline results.

**Table 5. The robustness check: an alternative methodology**

The table illustrates the influence of CSP on the firm’s stock liquidity using two-step system GMM as an alternative econometric method. Turny serves as the proxy for LIQ. ESG and E, S, G scores are the proxies for CSP. Firm characteristics are included in control variables. The values \*\*\*, \*\*, and \*, respectively, show significance at 1%, 5%, and 10% levels, in turns. T-statistics are provided in parenthesis. The variable definitions are in Appendix A.

	(1)	(2)	(3)	(4)
VARIABLES	Turny	Turny	Turny	Turny
ESG100	-11.0392***			

	(1.0760)			
ENV100		-5.6648***		
		(1.2507)		
SOC100			-5.6295***	
			(0.7136)	
CGV100				-4.2602***
				(0.5019)
SIZE	0.1971	-0.0433	-0.0292	-0.3430**
	(0.2070)	(0.1962)	(0.1847)	(0.1555)
PROF	-6.0767***	-7.9116***	-7.5450***	-7.5098***
	(1.7996)	(2.5427)	(1.4696)	(1.2327)
DEP	28.5115***	27.6497***	27.9635***	30.5359***
	(6.9587)	(7.2844)	(6.3051)	(4.3087)
MTB	-0.0345	-0.0339	-0.0450	-0.0316
	(0.0342)	(0.0350)	(0.0363)	(0.0306)
RD	29.7359***	19.7586**	22.8115***	13.6421*
	(8.0355)	(9.3865)	(8.3613)	(7.0604)
RDDUM	1.6686**	2.6788***	1.8778***	2.0064***
	(0.7165)	(0.8077)	(0.7037)	(0.6492)
TANG	-3.7564***	-3.8257***	-3.7795***	-5.1638***
	(1.3535)	(1.4032)	(1.3573)	(1.1490)
ALEV	6.9947***	6.4315***	5.1560***	5.5803***
	(1.1409)	(1.5510)	(1.1071)	(1.1714)
Constant	4.0898	5.2402	5.8685**	9.3201***
	(3.2384)	(3.2632)	(2.8754)	(2.6734)
Observations	757	757	757	757
Number of id	145	145	145	145
Year FE	YES	YES	YES	YES
AR(1)	0.014	0.014	0.016	0.015
AR(2)	0.109	0.196	0.118	0.125
P-Value	0.445	0.292	0.325	0.207
Hansen Test				

#### 5.4. The role of institutional environments in remodeling CSP – Liquidity association

Table 6 reports the result. As expected, the correlation coefficients of the interaction terms, , used as the variables explaining the way institutional environments influence the CSP – Liquidity association, are statistically significant and positive, indicating that institutional environments can weaken the undesirable correlation between CSP and the stock liquidity of firms. This result supports the hypothesis H2.

**Table 6. Institutional environments and CSP – LIQ relationship.**

The table following shows the regression findings. Stock liquidity (LIQ), represented by Turny, is the dependent variable. There are a total of six elements of institutional environments, which are: Eliabs, formalism, bankrp, antidir, edisclose and cifar. ESG scores are the only proxy for CSP. Firm characteristics are included in control variables. The values \*\*\*, \*\*, and \*, in turn, show significance at 1%, 5%, and 10% levels. T-statistics are provided in parenthesis. The variable definitions are in Appendix A.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	ELIABS	FORMALISM	BANKRP	ANTIDIR	EDISCLOSE	CIFAR
ESG100	-11.3023***	-20.4634***	-8.7977***	-8.8620**	-12.4784*	-35.5587*
	(3.9423)	(7.8521)	(2.4153)	(4.4898)	(6.4113)	(18.4842)
INSENV	-5.7262*	-1.7773	-2.9800**	-3.4246***	-5.2080	-22.2892*

	(3.2424)	(1.1302)	(1.2312)	(1.0329)	(4.5948)	(12.7679)
ESG_INSENV	16.4255***	5.5108**	7.0915***	3.6059*	15.6995*	46.4744*
	(6.2084)	(2.3608)	(2.5265)	(2.1033)	(8.8680)	(24.9080)
SIZE	-0.6667***	-0.7167***	-0.5628***	-0.6384***	-0.6381***	-0.7372***
	(0.1913)	(0.1683)	(0.1742)	(0.1849)	(0.1923)	(0.2003)
PROF	-14.9426***	-14.9521***	-14.5995***	-13.9449***	-14.9894***	-14.2067***
	(2.5334)	(2.7044)	(2.7051)	(2.4888)	(2.5776)	(2.8714)
DEP	25.2354***	30.0450***	27.5958***	23.3534***	24.6510***	21.0944***
	(6.1310)	(6.6417)	(6.6869)	(6.0315)	(6.1856)	(6.6044)
MTB	0.0205	0.0159	0.0197	0.0232	0.0158	0.0156
	(0.0364)	(0.0399)	(0.0404)	(0.0363)	(0.0367)	(0.0382)
RD	29.6081***	27.3627***	31.1538***	27.6327***	30.9277***	31.6134***
	(7.4187)	(7.8445)	(7.7799)	(7.2967)	(7.4288)	(7.7333)
RDDUM	2.8204***	2.2034***	2.2082***	1.2764	3.0189***	3.2866***
	(0.7664)	(0.8151)	(0.8086)	(0.7845)	(0.7659)	(0.7994)
TANG	-1.7047	-4.2241***	-3.0152***	-1.0096	-1.1845	-0.0905
	(1.1727)	(1.1275)	(1.1503)	(1.1389)	(1.1716)	(1.3268)
ALEV	6.7079***	5.8651***	5.1906***	6.6882***	6.0681***	5.7355***
	(1.3172)	(1.3543)	(1.3402)	(1.2761)	(1.3037)	(1.3962)
Constant	15.7722***	20.8523***	14.6266***	20.5878***	15.4653**	29.5450***
	(5.6975)	(5.8860)	(4.5440)	(5.6526)	(6.3781)	(11.1332)
Observations	637	757	757	637	637	592
R-squared	0.2441	0.2066	0.2060	0.2744	0.2376	0.2178
Year FE	YES	YES	YES	YES	YES	YES

## 6. CONCLUSIONS

This study explores the implications of CSP initiative investments on the firm's stock liquidity in emerging countries. Based on an analysis of 06 emerging countries data from the year 2002 to 2016, I conclude that there is a negative correlation between CSP and the stock liquidity, implying that CSP investment could place a significant financial strain on businesses in these nations. Each component of ESG has a different negative impact on stock liquidity at different levels, except for environmental scores. The results remained unchanged through various robustness tests. Furthermore, I find that the adverse impact of CSP on the stock liquidity is significantly improved in countries with extremely strong institutional frameworks.

The study has various implications. At firm-level, the findings may encourage managers to enhance governance and administration practices, in an effort to promote long-lasting CSP initiatives and a rise in stock liquidity. At the national level, policymakers initially can develop a complete legal framework to strengthen their institutional contexts in order to establish favorable conditions for businesses to uphold their social obligations, and lessen the negative effects of CSP issues on their companies. Public and regulatory authorities should have some campaigns granting for the CSP activities of firms as well as glorifying the firms that have effective CSP initiatives and responsibility in terms of social concerns. In this way, CSP projects will be considered an opportunity rather than a cost

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## THE ROLE OF AGILE LEADERSHIP AND STRATEGIC FLEXIBILITY TO SMES' DIGITAL TRANSFORMATION IN THE CENTRAL AND CENTRAL HIGHLANDS REGIONS OF VIETNAM

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**ABSTRACT:** *This research aims to examine the role of agile leadership and strategic flexibility in the digital transformation of SMEs in Central and Central Highlands regions in Vietnam. This work applied structural equation modeling (SEM-PLS) and a multi-group analysis to test four hypotheses, with data from 97 SMEs in Central and Central Highlands regions, Vietnam. Empirical results showed that: Strategic flexibility becomes the key to success in implementing digital transformation of SMEs in the Central and Central Highlands regions. Moreover, the transformation of the workforce and dynamic capability of the enterprise is also decisive factor in creating digital transformation in SMEs.*

**Keywords:** *agile leadership, strategic flexibility, digital transformation, SMEs*

### 1. INTRODUCTION

In recent years, digital transformation has become a significant trend across the world as businesses seek to embrace new technologies and innovative business models. In Vietnam, the government has also identified digital transformation as a key priority, to create a digital economy and improve the competitiveness of Vietnamese businesses. Digital transformation is rapidly spreading across all types of organizations including SMEs and has a significant impact on them and their business environment. The digital transformation of SMEs has been investigated in various countries. However, there is a lack of research on this topic in Vietnam, especially in the Central Highlands, where SMEs have unique characteristics such as a collectivistic society, low risk tolerance, and a rapidly changing political and legal environment. Therefore, studying the digital transformation of SMEs in this region is necessary for achieving the national digital transformation goal and enhancing economic development. As a means to achieve this purpose, the following research questions were formulated:

*“What are the roles of agile leadership and strategic flexibility in improving SMEs digital transformation in Central and Central Highlands regions of Vietnam?”*

In order to answer that question, the authors have conducted a study with the following objectives:

Reviewing the literature regarding agile leadership, strategic flexibility, and digital transformation.

Establishing scales to measure agile leadership, strategic flexibility, and digital transformation of SMEs in Central and Central Highlands regions of Vietnam.

Conducting a survey on SMEs in Central and Central Highlands regions of Vietnam upon their leadership, strategic flexibility, and digital transformation.

Analysing the data collected from the SMEs in Central and Central Highlands regions of Vietnam.

Drawing conclusion and recommendation from the data analysis.

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## **2. LITERATURE REVIEW**

### **2.1. Digital Transformation for SMEs**

The authors approach digital transformation by definition digital transformation is a business process that facilitates the relationship between a company and its customers by simplifying various processes through the use of recent technology. This change is not only restricted to technology implementation, but also affects the company's structure and strategy to align with the new business model resulting from the new technology. The dimensions for measuring Digital Transformation include: navigating the innovation ecosystem, redesigning internal structures, and enhancing digital maturity, (Warner & Wäger, 2019).

### **2.2. Workforce Transformation and Strategic Flexibility**

Workforce transformation is the process of adapting the workforce to changing business needs, strategies, and technologies. According to a report by Deloitte (2021), it involves identifying the skills and capabilities needed for the future, developing and upskilling employees to meet those needs, and creating a culture of continuous learning and improvement. From dimensions to measure workforce transformation of Shaughnessy (2018) and Stevens (2018), this research will measure workforce transformation using the dimensions of skills and qualities required from the workforce, adoption of new social values, flexible and fluid work, and faster and more adaptive work on a daily basis.

According to (Warner & Wäger, 2019), Strategic flexibility is a company's ability to respond to changes in the dynamic business environment in order to achieve the objectives, with the support of knowledge and superior capabilities. The strategic capabilities are comprised of an integrated workforce, process, product, and system. Adopted from (Warner & Wäger, 2019) we measure strategic flexibility through four items, which are sensitivity, strategy, leadership unity, and resource fluidity.

A study in agrifood nanotechnology (Yawson & Greiman, 2017), found that workforce transformation through human resource development can identify future skill needs, provide skills training and development, identify opportunities and challenges, and increase coordination and consultation among stakeholders, thereby creating strategic flexibility for the company. So hypothesis can be concluded as follows:

H1. There is a positive relationship between workforce transformation and strategic flexibility.

### **2.3. Dynamic Capability and Strategic Flexibility**

The authors approach dynamic capability is an organization's ability to adapt to changing environments by reconfiguring resources and processes and disseminating knowledge to all members of the organization persistently. From the dimensions to measure the Dynamic capability of Gnizy et al. (2014); Oliva et al. (2018); (Park et al., 2018); (Tallott & Hilliard, 2016), we conclude that the dimensions for measuring dynamic capabilities include sensing, adaptive, innovation, networking, learning, integrating, and coordinating capabilities.

Based on previous research, companies need to build strong dynamic capabilities to quickly create, deploy, and transform business models to remain relevant in the current digital economies (Teece, 2018; Teece & Linden, 2017; Velu, 2017). And according to (Schneider & Spieth, 2014), the utilization of information technology by SMEs is an example of high dynamic capability, which enables them to achieve objectives more efficiently, develop strategic flexibility, and adapt to competitive positions. As such, we hypothesize the following:

H2. There is a positive relationship between dynamic capability and strategic flexibility



## 2.4. Strategic Flexibility and Digital Transformation

Warner (2013) proved that strategic flexibility has the potential to give positive impacts of technological capabilities. In the digital era, companies are encouraged to transition from traditional to digital methods. Achieving this change requires strategic flexibility to enable companies to respond to uncertainty and achieve their objectives. Based on this, hypothesis 3 can be stated as follows:

H3. There is a positive relationship between strategic flexibility and digital transformation.

## 2.5. The Moderating Role of Agile Leadership:

The authors argue that successful strategic flexibility and digital transformation is determined with the existence of agile leadership. Agile leadership is an agile leader who can guide his team and continually influence the team behaviour by defining, spreading, and maintaining organizational vision (Perker et al., 2015). From the dimensions of previous studies, we use dimensions to measure agile leadership are: shares responsibility, effective in recognizing problems and making decisions, adaptive systems, and flexible structure.

According to previous research results, an organization will have greater agility capability, if a leader uses a far-ahead and strategic perspective. Agile leadership allows congruence in the implementation of strategies, and quickly articulates and creates a strategy into the choice of business logic, as well as infrastructure. The skills, system infrastructure, functions, and processes are required in articulating and prototyping essential strategies in preparing SMEs to quickly respond to the changing environments (Li et al., 2018). Thus, Hypothesis 4 is as follows:

H4. Agile leadership strengthens the relationship between strategic flexibility and digital transformation.

## 2.6. Conceptual framework

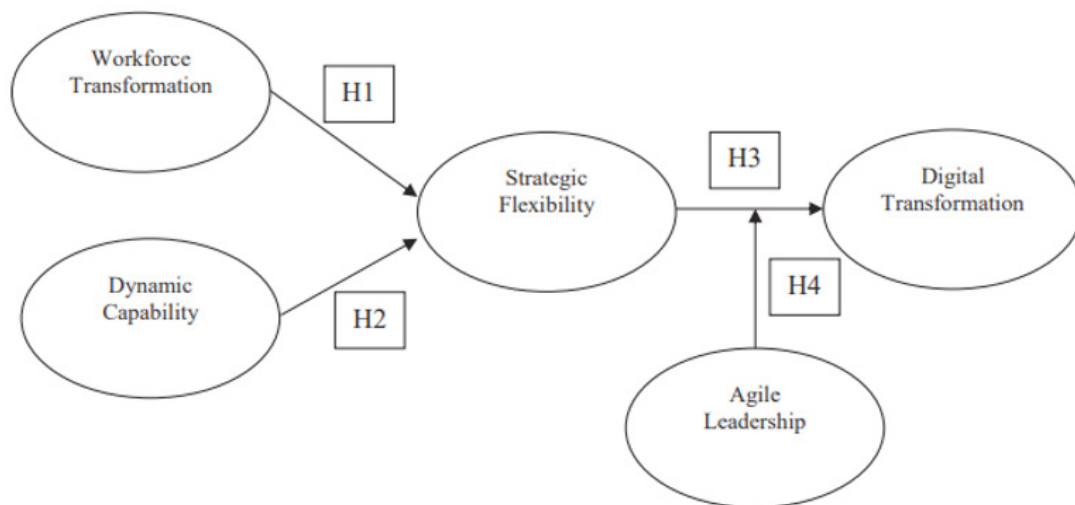


Figure 1: Conceptual framework- Olivia Fachrunnisa et al., (2020)

This model fits a strategic approach since it adheres to the idea of strategic alignment, which is a crucial element of strategic management. The process of matching an organization's actions and resources with its strategic goals and objectives is known as strategic alignment (Hussein et al., 2020). The model indicates that a strategic approach is required to guarantee that an organization's workforce, strategy, and digital capabilities that are aligned with the goals and objectives of the organisation in question by tying workforce transformation to strategic flexibility and digital transformation.

### **3. METHODOLOGY**

#### **3.1. Population, Sample and Data Collection**

In this research, a survey methodology was employed to gather primary data for empirical analysis. The study population consisted of SMEs that extensively utilize basic digital technologies such as social media for marketing and client partnership purposes and these enterprises in the Central and Central Highlands regions of Vietnam. The sample for this study comprises SMEs with fewer than 200 employees, and the sampling technique used was non-random with a purposive sampling method. The criteria of SMEs selected as samples in this study are based on Article 6, Decree No. 39/2018/ND-CP dated 11/03/2018 of the Government of Vietnam. And after nearly 2 months, a total of 97 usable surveys were collected.

#### **3.2. Measures**

The questionnaire includes multiple-choice questions built on a 5-level likert scale from 1 (Strongly disagree) to 5 (Strongly agree) and consists of 27 items.

The questionnaire form was developed into two main parts. In the first part of the questionnaire, 7 questions determining demographic characteristics such as type of enterprise; annual sale; employee staff;... In the second part, there were 20 questions belonging to five earlier-mentioned factors. And the respondents of these questionnaires are Managers or Owners of SMEs.

With “Workforce Transformation” construct, we used 4 items which were developed by combining insights from previous studies by Kucukusta et al. (2015), Liu (2014), Shaugnessy (2018), and Stevens (2018). In addition, the authors found that Vietnam has a high collectivist culture, so they added 1 observed variable related to Vietnam’s collectivist culture to examine the Workforce Transformation.

“Dynamic Capability” construct, we used 2 items, adapted from previous studies by Bamel and Bamel (2018), Gnizy et al. (2014), and Schilke et al. (2018). Furthermore, Vietnam’s state institutions are not yet complete, leading to a rapidly changing political and legal environment, hence the authors have added 1 observed variable about the ability of SMEs to adapt to regulatory changes of the government.

“Strategic Flexibility”, to measure this construct, we adopted multi-items from Warner and Wäger’s (2019) research and used three items.

“Agile Leadership” construct we used four items adapted from Perker et al. (2015) and added 2 observed variables about leadership’s awareness of digital transformation.

“Digital Transformation” construct, we used three items developed by Warner and Wäger (2019).

### **4. DATA ANALYSIS RESULTS**

#### **4.1. Description of the characteristics of respondents**

##### **4.1.1. The characteristics of demographic**

In terms of position in SMEs, 58.8% were managers and 41.2% were owners. In this survey, the majority of respondents (81.4%) were SMEs respondents working in the commerce and services sector, while 18.6% were from other business sectors. The majority of SMEs in Central Vietnam (58.8%) employ between 11 and 50 people. SMEs with less than 10 employees and those with 51 to 100 workers come in second with 39.2% and 2.1%, respectively. Considering the prospect of annual sales, the annual sales of most SMEs in Central Vietnam have a production capability of >3 (75.3%), and the other have a production capability between 3 and 50 (24.7%).

#### 4.1.2. T test: Test for differences for qualitative subjects

Sig F-test is equal to  $0.798 > 0.05$ , there is no difference in variance between the business fields and the digital transformation.

#### 4.2. Evaluation of the measurement model

The proposed variance model's latent variables were evaluated for tightness, unidimensionality, validity, and reliability using a modeling technique adapted from Garver and Mentzer (1999). PLS-SEM 4 software was used for statistical analysis and model development, beginning with initial techniques for quality assessment, reliability, convergence, and discriminability of observed variables. More rigorous approaches using the confirmatory factor analysis module of SEM were subsequently applied, as introduced by Anderson and Gerbing (1982) and Gerbing and Anderson (1988).

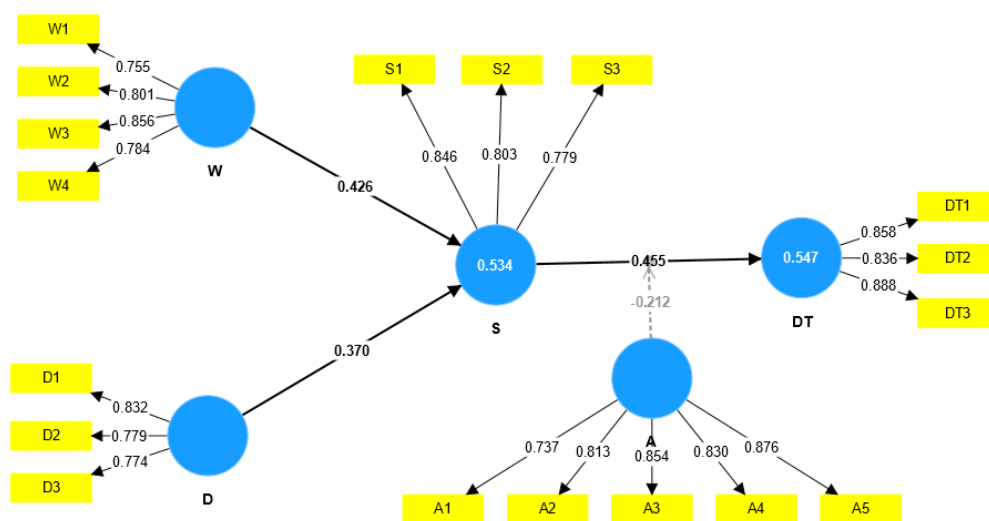


Figure 1: Structural proposal model

#### 4.1.1. Assess the quality of observed variables (Indicators)

The use of SMART-PLS software for model analysis yielded results identical to those presented in Table 11. All observed variables were found to have Outer loading coefficients exceeding 0.7, in line with the theoretical framework. This finding indicates that the indicators are meaningful and can be used to interpret the outcomes of the model. Furthermore, these indicators show that the relationship between the observed variables and the corresponding latent variables is strong.

#### 4.1.2. Assess Construct Reliability

According to the processing results, the reliability metrics of the scale were evaluated using both Cronbach's Alpha and Composite Reliability. It was found that both indices exceeded the desired threshold of 0.7, indicating that the observed variables of the scale were highly reliable and represented a high degree of representativeness of the variable. This indicates that the proposed model is suitable for evaluating the relationship between the variables under investigation.

#### 4.1.3. Assess Convergent Validity

After examining the a-priori model, none of the observed variables violated the convergence. All observed variables have convergent values above 0.6. This shows that the scale has done its job well. All indicators have

a strong positive correlation with each other. Therefore, the results suggest that the scale used in this study has a high level of convergence and can be considered appropriate for further statistical analysis.

#### **4.1.4. Assess Discriminant Validity**

The exact threshold level of the HTMT is a debatable situation. Clark & Watson (2016) and Kline (2015) suggest a threshold of 0.85, whereas others propose that if this value is below 0.9, discrimination will be guaranteed (Gold et al., 2001; Henseler et al., 2013). In this study, we use the threshold of the HTMT index is less than 0.9. The analysis shows that the HTMT indexes are all less than 0.9, ensuring the discriminant for the observed variables in the model.

#### **4.2. Structural Model Evaluation and hypotheses testing**

In this study, the authors employ the Bootstrapping technique to carry out hypothesis testing and evaluate the structural model.

##### **4.2.1. Path coefficients 4.3.2**

The results show that the P Values of the effects are all less than 0.05. The remaining effects are statistically significant. In addition, the Original Sample coefficients of these variables (W, D) are 0.426 and 0.37 respectively, which indicates that Digital Transformation has a stronger impact on Strategic Flexibility than Dynamic Capability. And based on table 15, it can be seen that Strategic Flexibility has a stronger impact on Digital Transformation than Agile Leadership has. In addition, the Original Sample of the effect of the interaction variable AxS on DT has the sign (-), which means that when the moderator variable A increases, the independent variable S will have a weaker effect on the dependent variable DT.

##### **4.2.2. Collinearity Evaluation:**

VIF Values of the independent variables are all less than 3, which is unlikely to have multicollinearity between the independent variables in this model.

##### **4.2.3. R-squared and R-squared adjusted**

The analysis results show that the independent variables W, D explains 52.4% of the variation of the dependent variable S. The independent variables S, A explains 53.2% of the variation of the dependent variable DT.

##### **4.2.4. The f-squared values:**

The results show that the relationship between the independent variables and the dependent variable in turn is as shown in the table above. In which, variable D and variable W are suggested to have a medium impact on variable S. However, the results show that moderate variable A can only affect variable DT with a small degree. The variable S is also suggested to have a positive effect in correlation with DT, f-squared value = 0.215, which indicates the mean influence.

##### **4.2.5. Total Indirect Effects**

P values of these effects are all less than 0.05 in the 95% statistical reliability. Hence, there is an indirect relationship between D-DT and W-DT with statistical significance.

##### **4.2.6. Specific Indirect Effects:**

The results in the table above show that the P Values of the effects are all less than 0.05, so these indirect effects are statistically significant. In which, the indirect effect from W to DT through the intermediate variable S is stronger than the indirect effect of D on DT through the mediated variable S.

**4.2.7. Summary of Hypotheses Tests:**

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ( O/STDEV )	P values
A → DT	0.263	0.264	0.105	2.494	0.013
D → S	0.370	0.386	0.122	3.035	0.002
S → DT	0.455	0.460	0.095	4.781	0.000
W → S	0.426	0.422	0.099	4.322	0.000
A x S → DT	-0.212	-0.213	0.070	3.015	0.003

**Table 1: Path coefficients**

After measurement model refinement and validation, the hypotheses presented in Chapter 2 were tested. The structural model results are presented in Figure 1 and Path coefficients in Table 1, The following hypotheses were tested:

***H1. There is a positive relationship between workforce transformation and strategic flexibility.***

The path from W to S was significant ( $p < 0.001$ ), in the direction hypothesized, and strong (0.426). The data supported the hypothesis.

***H2. There is a positive relationship between dynamic capability and strategic flexibility.***

The path from D to S was significant ( $p = 0.002$ ), in the direction hypothesized, and medium (0.37). The data supported the hypothesis.

***H3. There is a positive relationship between strategic flexibility and digital transformation.***

The path from S to DT was significant ( $p < 0.001$ ), in the direction hypothesized, and strong (0.455). The data supported the hypothesis.

***H4. Agile leadership strengthens the relationship between strategic flexibility and digital transformation.***

The path from AxS to DT was significant ( $p = 0.003$ ), in the direction hypothesized, and medium (-0.212) but it moderates in the opposite direction. This hypothesis was not supported by the data.

**5. CONCLUSION****5.1. Discussion**

Workforce transformation establishes a strong, positive, significant effect on strategic flexibility (the Original Sample coefficients(O)= 0.426,  $\rho$ -value < 0.001). The results indicate that frequent transformation of the workforce can enhance the likelihood of achieving strategic flexibility. This study confirms that the existence of workforce transformation, which combines knowledge, skills, and attitude of workers, is a precondition for achieving strategic flexibility. The study also shows that higher levels of workforce transformation in small and medium-sized enterprises (SMEs) can increase their ability to design strategic flexibility.

H2 is supported by the data. The findings demonstrate that dynamic capability has a positive effect on strategic flexibility (the Original Sample coefficients(O)= 0.37;  $\rho$ -value = 0.002). Dynamic capability, such as sensing, adaptiveness, innovation, networking, learning, and their integration, are important in developing strategic flexibility. Therefore, firms that focus on workforce transformation and dynamic capability are likely to invest resources in developing and supporting strategic capabilities, including strategic sensitivity, leadership unity, and resources fluidity.

In this study, it was found that there is a significant and positive relationship between strategic flexibility and digital transformation (the Original Sample coefficients (O) = 0.418;  $\rho$ -value < 0.001), which

is supported by the result of H3. Strategic flexibility has a strong impact on digital transformation, and this impact is enhanced by the combination of strategic planning, leadership, and resources.

According to the analysis, agile leadership has a negative moderation effect (the Original Sample coefficients(O) = -0.212;  $\rho$ -value= 0.013) on the interaction between strategic flexibility and digital transformation. This suggests that Agile leadership has a negative moderating effect on the relationship between strategic flexibility and digital transformation. This would suggest that the fast response of the leader followed by strategy flexibility may not be effective in achieving success in digital transformation implementation.

### **5.2. Contributions of the study:**

This research contributes to society and the scientific research world by examining the role of strategic flexibility and agile leadership in improving digital transformation in SMEs in the Central and Central Highlands regions of Vietnam. The findings of this research can help SMEs to take advantage of information technology advancements in their business processes, which can lead to improved competitiveness and economic growth. By understanding the importance of strategic flexibility, SMEs can respond quickly to changes and advances in information technology, and build dynamic capabilities to adapt to rapidly changing environments. This can help SMEs in Vietnam to improve their performance and contribute to the economic growth of the country. Additionally, the research highlights the importance of dynamic capabilities and workforce transformation in creating digital transformation in SMEs. because they enable firms to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments. Dynamic capabilities refer to a firm's ability to adapt to changing circumstances, while workforce transformation involves developing the skills and knowledge of employees to meet the demands of digital transformation. By building dynamic capabilities and transforming their workforce, SMEs can respond quickly to changes and advances in information technology, and build the flexibility and agility needed to succeed in the digital economy. Overall, this research paper provides valuable insights into the factors that contribute to successful digital transformation in SMEs in the context of the Central and Central Highlands regions of Vietnam.

### **5.3. Limitations and Recommendations**

Similar to many studies, the study is not without certain limitations. First of all, in order to draw an accurate result upon the roles of agile leadership and strategic flexibility in improving SMEs digital transformation in Central and Central Highlands regions of Vietnam, the study needs an abundance of samples. However, this research is limited by its sample. Though the study is expected with a large sample size to reduce bias, data gathering is limited for the student authors due to tight budget and time constraints.

An additional important consideration is that the sampling process is fairly difficult. Because the survey respondents for this study are owners and managers at enterprises. With the group of authors who are students, the relationship, as well as understanding of this survey respondents, is still limited. So the data collection process takes a lot of time and effort.

As the authors mentioned above in the report, in the data processing process, the authors removed 2 items from the questionnaire because they did not have enough impact on the latent variable. And these 2 items are in the original scale of the research paper on the same topic in Malaysia that the authors refer to. This implies that SMEs in Vietnam are different and special compared to other countries. Therefore, it enhances that there should be studies dedicated to SMEs in the Central Highlands region as well as to all SMEs in Vietnam.

In addition, the sample size for this study is limited. Hence, if this research paper is to be developed, the author should collect more samples and on a larger scale to explore other interesting analyzes and results.

Finally, this research examines the concept of strategic flexibility in terms of strategy changes, leadership unity and resources fluidity. Besides, agile leadership is evaluated based on leader competencies in sharing responsibility, recognizing problem and decisions making, adaptive system and flexible structure. However, it is important to consider context-specific approaches to fully leverage these two processes and achieve distinct outcomes in different situations such as varying environments and stages of development (Rosing et al., 2011). Therefore, when SMEs require innovative and experimental approaches to navigate fast-paced changes, alternative measures for strategic flexibility and agile leadership should be considered. Future studies can explore different types of strategic flexibility and agile leadership within diverse environmental and temporal contexts.

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## FACTORS AFFECTING THE DIGITAL STRATEGY AT SMALL AND MEDIUM ENTERPRISES IN DA NANG CITY

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**ABSTRACT:** *This study uses the Research Framework Technology - Organization - Environment (TOE) to analyze the factors affecting the decision to apply digital strategy in small and medium-sized enterprises in Da Nang city. The study uses a quantitative method with 175 samples including a system of questions referring to three TOE contexts collected from employees and managers at small and medium enterprises in Da Nang. Research results show that technology contexts offer comparative advantages that support profitable growth for businesses, while at the same time there are risks that limit digital readiness. The study also encourages managers to increase employee support and facilitation in technology adoption, as well as encouraging government to enact promotional policies and finance digital transformation in business. This research provides useful and theoretical insights that enhance the knowledge of how firms adapt to technology adoption and advise managers and policymakers on how to optimize their efforts to promote technology in business.*

**Keywords:** *SME(s), TOE, digital transformation, digital strategy, technology, financial performance organisation, environment, enterprises, business, Da Nang.*

### 1. INTRODUCTION

#### 1.1. Overview of research in the subject area

Technology enables SMEs in emerging economies to improve their competitiveness and make better decisions. By applying digital technologies, SMEs can increase their information flow, reduce their operational costs, and enhance their quality to gain a competitive edge. However, digital transformation is not without its difficulties and disadvantages. It can also result in negative outcomes due to gaps in knowledge, misconceptions about technology applications, and low ability to expand resources and align them with business objectives.

#### 1.2. Reasons for doing this research

The need for innovation and development in all aspects where digital technology plays the role of an effective support tool. Therefore, the application of digital technology to businesses has attracted much attention from researchers, practitioners, and policymakers in this field. Although the application of digital technology is very important and urgent, SMEs in Da Nang City are considered to have a slower rate of access. This research has proceeded to find out the motivations and factors that limit the access and application of digital technology in these organizations and it also helps SMEs and local authorities to come up with specific solutions.

#### 1.3. Objectives of the study

- General objective: Assessing the factors affecting the digital strategy in SMEs in Da Nang City.

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- The detailed goal is to find out the relationship between:
- + TOE factors and the strategy of applying digital technology in SMEs in Da Nang city.
- + The strategy of applying digital technology to financial performance in SMEs in Da Nang City.

#### **1.4. Research object, research scope**

##### **1.4.1. Research object**

Small and medium enterprises.

##### **1.4.2. Research scope**

Da Nang City, Vietnam.

#### **1.5. Methodology**

##### **1.5.1. Reasons for taking survey samples on employees and managers**

The decision to include both employees and managers in the research samples, rather than solely focusing on business owners, is supported by several academic justifications.

- Holistic Perspective:
- Employee Involvement:
- Managerial Decision-making:
- Organizational Culture and Structure:
- Stakeholder Alignment:

##### **1.5.2. Research methods**

###### **a) Data collection**

- The quantitative method was mainly used in the research

A questionnaire was used to collect data.

The number of valid surveys for analysis was 175 surveys.

- Sampling method:

The business matches the research topic and sends the survey to its employees and managers.

###### **b) Scale building**

The total of 8 independent groups of variables including Comparative advantages from digital transformation (as LTSS), Risks of applying digital technology (as RRUD), Support from top management (as UHQL), Organizational barriers (as RCTC), Effects of competitive pressure (as ALCT), Influence of government regulation (as QDCP), Digital Strategy (as CLKS), Financial performance of the company (as HQTC).

###### **c) Data analysis methods**

SPSS 20 and SmartPLS 4

###### **d) Data source:**

1. Primary data source

Source: The answers from 175 survey participants are employees of SMEs in Da Nang City.

2. Secondary data source

Source: From the Internet, magazines, books, newspapers, and related research papers

## **2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK**

### **2.1. SMEs**

SMEs are businesses that have a certain size limit in terms of employees, revenues, or assets. Different countries and industries have different criteria for defining SMEs. SMEs are essential for the economy because they create many jobs, especially in developing countries. They also help with innovation and entrepreneurship. SMEs are the majority of the businesses and employment around the world and are a high priority for many governments.

### **2.2. Digital transformation**

Digital transformation is the process of using technology to change tasks or processes that are not digital into digital form, so that computers can help with information management and communication. It also means using digitized products or systems to create new ways of doing business, such as new organizational processes, business models or services.

### **2.3. Digital strategy**

A digital strategy is a company's plan to use technology to grow the brand. It can help employees reach customers, increase sales and showcase their brand effectively. A company's leadership team may create and change its strategy based on market needs, popular technology or platforms and business performance.

### **2.4. Financial performance**

Financial performance is a measure of a company's financial health in terms of assets, liabilities, equity, expenses, revenue, and profitability. It is determined by using various formulas that relate to business activities and show how efficient a company is. Financial performance is important for internal and external users to evaluate the company's health, status, and investment potential.

### **2.5. The impact of digital transformation on digital strategy**

Digital transformation is the process of using technology to reach business objectives. It provides a framework for digital strategy. Digital transformation can help enterprises enhance their customer experience by offering more customized and good service, and by knowing customers better.

### **2.6. TOE Research Framework**

The TOE framework is a model that explains the factors affecting technology application and innovation in a firm. It considers three contexts: technology, organization, and environment. Technology refers to the attributes of technology inside and outside the firm that can affect its suitability, innovation, and usefulness. Organization refers to the attributes, characteristics, and resources of the firm that can affect its size, structure, management, human resources, and linkages. Environment refers to the attributes of the business environment that can affect its industry, competition, customers, regulations, and macroeconomics. These three factors can create barriers or opportunities for technological innovation in a firm.

### **2.7. Studies in Vietnam have applied the TOE model**

- Application of TOE model to analyze intention to accept and continue to use information and communication technology in tourism in Da Nang
- Incorporating TAM and TOE models into the study of social network acceptance in retail business in Vietnam

- The determinants of innovation in Vietnamese manufacturing firms: an empirical analysis using a technology–organization–environment framework
- An extended Technology-Organization-Environment (TOE) framework for online retailing utilization in Digital Transformation: Empirical evidence from Vietnam
- Protecting organizational information security at home during the COVID-19 pandemic in Vietnam: Exploratory findings from Technology - Organization - Environment Framework

#### **2.7.1. Studies in other countries have applied the TOE model**

- Using TOE theoretical framework to study the application of ERP solution
- Social commerce application using TOE framework: An empirical investigation of Saudi Arabian SMEs
- A Conceptual Framework of RFID Application in Retail Using TOE Framework
- Factors Influencing SMEs' Application of Cloud Computing Services in Lebanon: An Empirical Analysis Using TOE and Contextual Theory
- Exploring Risks in the Application of Business Intelligence in SMEs Using the TOE Framework

#### **2.7.2. Overall assessments**

The TOE framework is different from other theories of technology adoption because it includes both internal and external factors in one model. However, the TOE framework has some problems, such as ignoring the interplay between the three factors, missing important constructs and variables, and being vague and changing from context to context.

#### **2.7.3. Analysis of TOE factors affecting the application of digital technology in businesses**

##### **2.7.4. Technological factors**

###### **e) Comparative advantage**

Digital transformation brings many long-term benefits, such as better use of data, process improvement, innovation enhancement, smarter outsourcing, and customer-centricity. It can also help businesses save time and money, increase income and efficiency, reach more markets and customers, share more information, persuade more customers, perform better, work better, make better products and services, track and measure performance and productivity, and decide and plan well.

H1. Comparative advantage has a positive influence on digital strategy in SMEs

###### **a) Risks**

Although digital transformation brings various advantages for business, it also comes with many risks, such as cyber-attacks, information insecurity, loss of important data, dependence on technology, legal compliance issues, and human factors that affect the quality, accuracy, security, and performance of the business.

H2: Application risks influences the decision on digital strategy in SMEs

##### **2.7.5. Organizational factors**

###### **b) Support from senior management**

Top management support is the availability of resources and policies that support managers in the organization's strategic vision. It influences organizational decisions, behaviors, and strategies, as well as the knowledge and expectations of technology benefits.

H3: Support from top management positively affects the strategy of digital technology in SMEs

### c) Organizational barriers

There are barriers that businesses encounter in the process of digital transformation, such as high investment costs, difficulty in changing habits and practices, lack of human resources, lack of digital infrastructure, lack of information, difficulty in integrating solutions, lack of commitment and understanding of leaders and employees, and fear of data leakage.

H4: Organizational barriers limiting the application of a digital strategy in SMEs

### 2.7.6. Environment factor

#### d) Competition

Competitive pressure is a factor driving the application of technology by enterprises. When businesses have to meet the requirements and expectations of stakeholders such as customers, legal entities, governments, commercial partners, and others, they tend to apply technology faster.

H5: Competitive pressure positively affects digital strategy in SMEs

#### e) Government regulations:

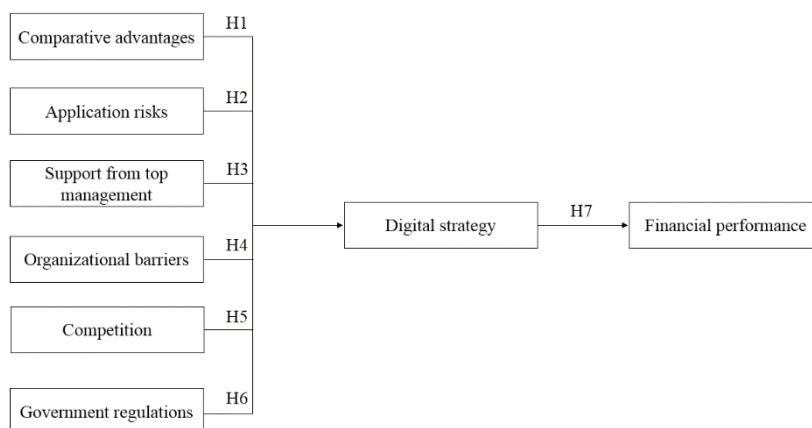
Government support is considered the most influential factor for digital technology application, especially in developing countries..

H6: Government regulations have a positive influence on the digital strategy in SMEs

H7. The digital strategy positively affects the financial performance in SMEs

The technology of digital transformation enhances business processes, even increases business revenue and income. It can increase satisfaction, better customer relegation, improve profitability and decrease minimum expenses.

Therefore, digital transformation application solutions bring more productive financial results.



## 3. RESEARCH RESULTS

### 3.1. General data

### 3.2. Data analysis

#### f) Outer loading

	ALCT	CLKS	HQTC	LTSS	QDCP	RCTC	RRUD	UHQL
ALCT1	0.770							
ALCT2	0.827							
ALCT3	0.812							
ALCT4	0.767							
CLKS1		0.733						
CLKS2		0.782						
CLKS3		0.802						
CLKS4		0.803						
CLKS5		0.726						
HQTC1			0.759					
HQTC2			0.851					
HQTC3			0.809					
HQTC4			0.700					
LTSS1				0.762				
LTSS2				0.775				
LTSS3				0.772				
LTSS4				0.790				
LTSS5				0.779				
QDCP1					0.804			
QDCP2					0.872			
QDCP3					0.784			
QDCP4					0.820			
RCTC1						0.780		
RCTC2						0.885		
RCTC3						0.881		
RCTC4						0.837		
RRUD1							0.775	
RRUD2							0.867	
RRUD3							0.792	
RRUD4							0.806	
UHQL1								0.845
UHQL2								0.850
UHQL3								0.829
UHQL4								0.780

- The Outer Loadings coefficient of the first-order variables are all greater than 0.7, so the first-order variables are significant in the model

**g) Construct Reliability and validity**

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
ALCT	0.805	0.806	0.872	0.631
CLKS	0.828	0.833	0.879	0.593
HQTC	0.786	0.788	0.862	0.611
LTSS	0.835	0.837	0.883	0.602
QDCP	0.839	0.851	0.892	0.674
RCTC	0.868	0.880	0.910	0.717
RRUD	0.826	0.834	0.885	0.657
UHQL	0.845	0.846	0.896	0.683

- The alpha coefficient of all items is mostly higher than 0.8, showing that the degree to which the scale is consistent and stable is good, only the alpha coefficient of the variable Financial Efficiency (0.788) is lower but still usable.

**h) Convergence**

- The AVE index of all variables is greater than 0.5, the scale achieves good convergent validity

**i) Discriminant validity**



	ALCT	CLKS	HQTC	LTSS	QDCP	RCTC	RRUD	UHQL
ALCT								
CLKS	0.579							
HQTC	0.585	0.712						
LTSS	0.548	0.658	0.518					
QDCP	0.718	0.519	0.468	0.447				
RCTC	0.744	0.443	0.311	0.387	0.590			
RRUD	0.368	0.275	0.264	0.304	0.331	0.501		
UHQL	0.511	0.571	0.540	0.577	0.467	0.416	0.387	

- Through the HTMT index, all HTMT index pairs of the latent variables are less than 0.85. Therefore, all pairs of variables ensure differentiation from each other.

**j) Collinearity statistics (VIF)**

	ALCT1	ALCT2	ALCT3	ALCT4	CLKS1	CLKS2	CLKS3	CLKS4	CLKS5
VIF	1.641	1.930	1.757	1.478	1.605	1.617	1.824	1.889	1.514
	HQTC1	HQTC2	HQTC3	HQTC4	LTSS1	LTSS2	LTSS3	LTSS4	LTSS5
VIF	1.943	2.283	1.738	1.321	1.924	2.013	1.679	1.763	1.733
	QDCP1	QDCP2	QDCP3	QDCP4	RCTC1	RCTC2	RCTC3	RCTC4	
VIF	1.903	2.213	1.804	1.970	1.780	2.480	2.507	2.252	
	RRUD1	RRUD2	RRUD3	RRUD4	UHQL1	UHQL2	UHQL3	UHQL4	
VIF	1.747	2.213	1.796	1.769	2.151	2.215	1.917	1.640	

In the Outer model - List section, we see that most of the VIF coefficients are less than 3, indicating that the independent variables are weakly correlated with each other. The Inner Model - List section has all VIF indices below 3. Conclusion, the model does not occur collinearity.

**k) Assessment of Impacts (PATH COEFFICIENTS of Bootstrap analysis) (P values , R-square )**

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
ALCT → CLKS	0.134	0.134	0.086	1.556	0.120
CLKS → HQTC	0.583	0.586	0.057	10.213	0.000
LTSS → CLKS	0.333	0.325	0.076	4.405	0.000
QDCP → CLKS	0.133	0.140	0.079	1.685	0.092
RCTC → CLKS	0.057	0.052	0.081	0.703	0.482
RRUD → CLKS	-0.023	-0.010	0.079	0.294	0.769
UHQL → CLKS	0.199	0.199	0.086	2.301	0.021

- The hypotheses between Competitive Pressure, Organizational Barriers, Application Risk and Digital Strategy have P values > 0.1. This proves that the hypothesis about them in the above statistics is ineffective. That means, the factors of Competitive Pressure, Organizational Barriers, Application Risk do not affect the use of Digital Strategies.

	R-square	R-square adjusted
CLKS	0.418	0.397
HQTC	0.340	0.336

- The adjusted R squared of Digital Strategy is 0.336, so the independent variable Digital Strategy explains 33.6% of the variation of Financial Efficiency.

**l) Correlation**

	ALCT	CLKS	HQTC	LTSS	QDCP	RCTC	RRUD	UHQL
ALCT	1.000	0.476	0.468	0.454	0.594	0.619	0.301	0.424
CLKS	0.476	1.000	0.583	0.553	0.439	0.378	0.228	0.481
HQTC	0.468	0.583	1.000	0.431	0.382	0.260	0.213	0.440
LTSS	0.454	0.553	0.431	1.000	0.379	0.332	0.255	0.483
QDCP	0.594	0.439	0.382	0.379	1.000	0.506	0.283	0.392
RCTC	0.619	0.378	0.260	0.332	0.506	1.000	0.425	0.354
RRUD	0.301	0.228	0.213	0.255	0.283	0.425	1.000	0.325
UHQL	0.424	0.481	0.440	0.483	0.392	0.354	0.325	1.000

- Organizational barriers have the greatest impact on competitive pressures, and conversely, application risks have the least impact of the rest of the factors. Financial performance has the most impact on digital strategy, but not significantly. Comparative advantage has the strongest correlation with digital strategy. Government regulation affects competitive pressures more than factors such as application risk or financial performance, etc. Support from management has a weakly correlated relationship with most of the rest of the factors.

**3.3. Discussion**

**3.3.1. Discussion**

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ( O/STDEV )	P values
ALCT -> CLKS	0.134	0.134	0.086	1.556	0.120
CLKS -> HQTC	0.583	0.586	0.057	10.213	0.000
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UHQL -> CLKS	0.199	0.199	0.086	2.301	0.021

There are 3 out of 6 variables that affect digital strategy. Firstly, top management is the main decision maker and an indispensable factor to build an ecosystem for business to apply technology. Digital transformation helps SMEs to observe the environment, make better decisions, and provide accurate and comprehensive data and information... Moreover, some studies have found that digital transformation creates financial performance for businesses and enhances their capabilities.

On the other hand, competitive advantage in smaller firms often arises accidentally because of operating circumstances surrounding the enterprise. This shows that within the same tier as SMEs, if some of them achieve a positive transformation on digital, it will create a competitive advantage over their competitors in the same area. Then, government regulations have less influence on digital application strategies. Most regulations are beneficial to process application of digital, but it is also limited to intellectual property rights. According to other studies the application of digital transformation is a challenge for SMEs due to the lack of expertise and the manager’s lack of confidence in their abilities. Apart from that, the loss of control over confidential data and the risk of disclosure and leakage of information to competitors negatively affects them to the application of digital transformation.

**3.3.2. Policy implications**

In practical terms, the results can be used to develop business strategies and support decision-making for managers. Theoretically, the research has contributed to enriching information related to the factors affecting the organizational decisions and confirmed the empirical evidence on the usefulness of digital transformation.

In the technology aspect, the above hypotheses suggest businesses should be more daring in approaching changes in technology and have measures to prevent technology risks and information.

In the organizational aspect, in Da Nang, the majority of enterprises are small in scale and lack knowledge of management and technology. Therefore, the creation of affiliate programs between enterprises and technology organizations is essential.

In the environmental aspect, SMEs in Da Nang need to get out of their comfort zone, set innovation, and compete in a world dominated by advanced technology. Digital transformation not only helps SMEs transform themselves, thereby receiving more new business opportunities.

Digital strategy helps to reduce the waste of budget and money without achieving efficiency and increasing corporate profits. Because after each campaign, measuring and adjusting the strategy will help businesses achieve their goals faster.

### **3.3.3. Limitations and directions for further research**

First, the survey sample was limited to SMEs, which differ in resources and structural flexibility compared with large enterprises.

Second, the study only focuses on Da Nang city. Therefore, in the following studies, these limitations can be overcome by expanding the scope of the study - not only in one city but also in the whole destination of Vietnam.

Third, the data collection method should be combined with the direct interview method to answer the questions arising from the interviewees thoroughly.

## **4. CONCLUSION**

The study used the TOE model to study the factors affecting the digital transformation of SMEs in Da Nang. This demonstrates that technological, organizational, and environmental contexts have a dramatic impact on decisions related to digital technology usage.

According to technology context, empirical research has proven that digital transformation will bring positive results by enhancing working quality and efficiency, influencing decisions to apply technology in organizations. SMEs should apply digital transformation to gain comparative advantage even if it challenges their businesses.

According to organizational context, top manager support has been proven to have a positive effect on applying digital technology strategy. The findings highlight the importance of top management support in driving the application of digital transformation in organizations. However organizational barriers, lack of capital/ financial resources does not affect the maximum exploitation of digital technology.

According to the environmental context, digital strategy in SMEs is not strongly influenced by government regulations. Local governments have not had many solutions to reduce cost, establish technology infrastructure and regulatory frameworks still lack the agility. In the era of digital transformation technology 4.0, the application of that by businesses is an advantage for SMEs to gain competitive advantages, survive and develop.

### **TÀI LIỆU THAM KHẢO**

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## THE IMPACT OF RISK – TAKING BEHAVIOR ON CREDIT RISK: EVIDENCE FROM VIETNAM

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*ABSTRACT: After the crises, the complexity of the monetary transmission mechanism is becoming more evident when they not only affect money supply, credit, and interest rates but also can affect the tendency to accept risks of subjects in the economy, especially financial intermediaries. This study aims to evaluate the impact of this behavior on the loss loan reserve ratio of commercial banks in Vietnam based on panel data regression model. Some implications and policies have been recommended to State Bank of Vietnam to operate monetary policy flexibly and cautiously so that the effectiveness of the risk-taking channel is maximized. Keywords: low – interest rate; risk – taking behavior; credit risk; State Bank of Vietnam.*

### 1. INTRODUCTION

Since the Global Financial Crisis of 2008 and economic shocks of the COVID-19 crisis, the question of whether low interest rates encourage bank risk-taking has been extensively debated, especially in the context of advanced economies (Altunbas, Gambacorta, & Marques-Ibanez, 2014; Delis, Hasan, & Mylonidis, 2012; Jiménez, Ongena, Peydró, & Saurina, 2014). Because poor risk management practices, including excessive risk-taking behaviors by commercial banks, have been identified as one of the key contributing factors to the outbreak of the Global Financial Crisis.

Recent studies show that “too low for too long” interest rates result in higher risk-taking by banks through a “risk-taking channel”. Low-interest rates maintained over a prolonged period through monetary policy may incentivize banks to lend more (Maddaloni and Peydro, 2011) and accept a higher level of risk (Altunbas et al., 2014; Jimenez et al., 2014) in order to generate returns on their investments for four reasons: (i) low-interest rates promote risk-taking through the effect of interest rates on valuation, earnings and cash flow; (ii) low-interest rates create incentives for bank managers and businesses to seek profits; (iii) low-interest rates increase equity value and encourage credit institutions to accept more risks; (iv) The increased level of information transparency and policy commitment of the Central Bank reduces instability, causing market participants to underestimate risks, thereby increasing the desire to accept risks. bank risk. If banks are incentivized to take on excessive risks by low-interest rates and other factors, and this behavior is not well controlled, it could lead to an imbalance between the banks’ ability to manage risks and the level of risks they are taking on. This could potentially pose risks to the stability and functioning of the financial system. The collapse of major financial institutions and financial systems around the world such as in the US, Spain, Turkey, and Ireland,... since 2008 has shown the seriousness of risk-taking behavior of financial institutions.

In Vietnam, during the period 2015-2019, the effectiveness of the transmission mechanism of the monetary policies has been increasingly improved. However, the COVID-19 pandemic has posed significant challenges for businesses and people which made the State Bank of Vietnam implement a loosening

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monetary policy with relatively low-interest rates to support capital for production and contribute to the implementation of social security policies. Credit growth has always exceeded the target set by the State Bank of Vietnam and the ratio of credit to GDP reached 124% at the end of 2021, which was one of the highest in the world. The increased financial leverage of the business system, and speculative markets such as stocks, real estate, and foreign currencies have caused many consequences, indicating the development of this risk-taking channel. Our paper aims at obtaining to find the impact of risk-taking behavior on credit risk through loan loss provision in Vietnam. In Vietnam, there have not been any reports or scientific studies indicating the impact of the risk-taking channel. Previous studies only determined the overview of the risk-taking channel. Therefore, based on preliminary content from previous studies, our paper focuses on assessing the impact of risk-taking behavior on the credit risk of commercial banks.

The remainder of this paper is structured as follows. Section 2 provides a literature review about the impact of risk-taking behavior. Section 3 introduces the data set and the empirical methodology. Section 4 presents the results of risk-taking behavior on bank risk. Section 5 concludes with some policy implications.

## 2. LITERATURE REVIEW

Low interest rates maintained over a long period of time through loosening monetary policies not only encourage banks to lend to customers as described in the traditional credit channel but also encourage banks to accept higher levels of risk (Altunbas et al, 2010). This is the main cause leading to the emergence of the risk-taking channel, a new channel in the transmission of monetary policies. Unlike traditional transmission channels, the risk-taking channel began to be studied from the beginning of the 21st century and received special attention after the outbreak of the financial crisis.

Using a VAR regression model, data from 140 banks in Europe and from the European Central Bank (ECB) from 2003 to 2016, Matthias Neuenkirch and Matthias Nockel (2018) evaluated the impact of the ECB's interest rate cut on the behavior of banks in the euro area. The authors pointed out that during the period of low-interest rates, banks were willing to lower credit standards to provide more credit. Although banks knew they had to maintain stable credit operations during this period, they were unsuccessful in stabilizing credit supply, causing instability in the financial system in the euro area as well as the global financial system.

Nimrod Segev (2020) presented the impact of the monetary policy transmission mechanism through the risk-taking channel in the United States. The United States is one of the countries most affected by the 2008 financial crisis. In a short period from May 2001 to December 2002, the FED reduced the interbank lending rate 11 times from 6.5% to 1.75%. In an easy credit environment, US banks tended to lend recklessly to stimulate the development of the real estate sector and construction industry as a driving force for economic growth. The real estate bubble gradually formed and developed to an extreme level and burst, leading to non-performing loans which many banks could not recover from, causing significant losses and the collapse of many financial institutions. Nimrod Segev's research also showed that the monetary policy transmission mechanism affects the scale and risk acceptance level of banks. When the transmission mechanism is maintained over a long period of time, banks will loosen their risk sensitivity to seek more profits, leading them to accept more risk to provide unsecured loans.

In addition, Paligorova and Jimenez's study (2012) evaluates the effectiveness of the risk-taking channel from the perspective of the lending behavior of banks. The article was based on data on the information of loans combined with the balance sheet data of banks in Canada from 1993 to 2010. The research results showed that the trend of reckless lending by banks was clearly shown during the period of low interest rates through an increase in the number of risky loans that were illiquid.

In Viet Nam, Nguyen Thi Kieu Nga (2021) pointed out the evidence of a positive relationship between interbank interest rates and risk-taking level. The 3-month and 6-month term deposit rates have a positive impact on the risk acceptance level, reflecting the high information asymmetry in Vietnamese banks. The real estate bubble bursting at the end of 2011 and the beginning of 2012 caused adverse effects on real estate businesses and banks involved in financing these businesses. After this period, banks continued to increase mobilized capital to invest in real estate, causing interbank interest rates to continuously increase from about 9% in 2009 to nearly 11% in 2010, reaching a peak of almost 14% in 2011. This reflects the instability of the interbank lending system due to the overuse of mobilized capital to finance the real estate market. The “put all eggs in one basket “ behavior of many banks led to the 2012 non-performing loan crisis.

Furthermore, the study of Ha Thi Sau et al. (2013) provided evidence of the existence of the risk-taking channel in the transmission of monetary policy. The authors found that in the years 2006-2007 and 2009-2010, monetary policy was loosened, increasing the risk acceptance level of the banking system, which was reflected in the pursuit of high profit and growth targets, and contributed to the expansion of the scale of the banking system.

In general, domestic studies currently only provide an overview of the risk-taking channel. Therefore, based on the preliminary content from previous studies, the research group’s study has two new contributions to the topic. First, our paper focuses on in-depth evaluation of the effectiveness of the risk-taking channel from the perspective of its impact on credit risk. Second, the study is particularly relevant in the context of the COVID-19 pandemic where the central bank has lowered interest rates, making the risk-taking behavior of banks more evident.

### 3. METHODOLOGY AND MODEL SPECIFICATIONS

#### 3.1. Model

The research team uses a simple linear regression model based on previous research models to analyze and evaluate the impact of the risk-taking channel of monetary policy on the loss loan provision - loss loan reserve of listed commercial banks in Vietnam from 2011 to the end of 2022. Based on the research of Mite Mitesk et al (2018), Neuenkirch, M., and Nöckel, M. (2018), V.D.Dang and V.C.Dang (2020) the research team builds a model to assess the impact of behavior Risk tolerance to the size of banks in Vietnam with the variables shown in Table 1:

Moreover, to check the consistency of the model, we alternately use the Rate variables (Lrate, Prate, and ONrate) to represent the monetary policy variable to clearly see the risk-taking behavior of commercial banks in Vietnam.

**Table 1: Variables**

Variable	Variable name	Expected impact
RATE	Lrate	+
	Prate	+
	ONrate	+
ROE	Return on equity	-
SIZE	Bank's size	+
GDP	Economic growth	-
INF	Inflation	-
COVID	COVID-19 period	+



### 3.3. Data

#### 3.3.1. Dependent variable

**Loss loan reserve ratio (LLR):** Loss loan reserve is an amount set aside to provide for possible losses due to the credit institution's customers' failure to fulfill their obligations. commitment service. Provisions for risks are calculated according to the principal outstanding balance and accounted into operating expenses of credit institutions. The setting up of provisions for credit risks is based on the classification of debts at the bank. Credit institutions and banks base on qualitative and quantitative standards to assess the risk level of loans and off-balance sheet commitments, on that basis, classify debts into debt groups. fit. LLR represents each bank's provision for its loans, mainly belonging to the credit group classified as Bad debt - or Non-performing loan.

#### 3.3.2. Independent variable

- Group of macro variables

**Economic growth (GDP):** Measured by the national economic growth indicator, to show the development potential of a business in the economy. In a state of stability and growth, the economy will open up to new investment opportunities, introducing new rigorous conditions for businesses to find the right investors with the right capital to invest. for new projects, leading to an impact on the use of debt for new investment activities. This indicator has a positive effect on the performance of enterprises. An increase in GDP causes businesses to attract investors, increases business output and consumer income, leading to increased spending and boosting markets, increasing corporate profits.

**Inflation Rate (INF):** Along with economic growth (GDP) is the inflation rate. Fofack (2005) and Klein, N. (2013), macro factors including economic growth rate, inflation rate also affect the micro factors of the bank.

**Interest Rate Variables (Rate):** In fact, there is still no consensus on the best interest rates to reflect the monetary policy stance in the existing literature (Altunbas et al. et al., 2010; Chen et al., 2017; de Moraes et al., 2016; Ehrmann, 2003; Khan et al., 2016; Olivero et al., 2011; Sáiz et al., 2018; Yang & Shao, 2016) Therefore, the authors have used 3 alternately 3 different interest rate variables, namely average lending rate of commercial banks - or lending rate (Lrate), policy interest rate (Prate) and interbank interest rate - or overnight rate (ONrate). The research team selected lending interest rates due to available data and suitable for Vietnam. In addition, with the above discussion on monetary policy, lending interest rate becomes the most appropriate indicator of monetary policy in Vietnam, where the SBV regularly makes adjustments and interventions to regulate monetary policy. the borrower's cost of capital. Next, the research team approaches the operating interest rate that the SBV uses to charge commercial banks for short-term credit transactions as lenders of last resort. The operating interest rate can be raised or lowered to stabilize or regulate a country's economic activity. The interbank rate - or overnight rate, is the interest rate used by banks in transacting with each other. The overnight interest rate is generally lower than other interest rates and is seen as the base rate of the economy, as well as an important indicator to be watched in the monetary policy of several countries.

- Group of micro variables (characteristics of commercial banks)

Besides, the research team also takes into account a number of bank-specific factors, including:

**Bank Size (SIZE):** First, larger banks can benefit from portfolio diversification and economies of scale, which will reduce their exposure to risk. them (Abedifar et al., 2013; Tan and Floros, 2013). Second, the relationship between bank capital and bank risk could be negative, as higher capital buffers make bank owners more careful with their investments.

**Return on Equity (ROE):** Using the relationship between profit after tax and the capital of the business owner to determine profitability, we use the formula:

$$\text{Return on Equity} = \text{Net income Shareholder's equity} \times 100\%$$

This index most clearly reflects the production and business efficiency of enterprises from owners' equity. The larger this coefficient, the higher the return to the owner's equity, the owner's investment capital is also managed and used properly. Profit margin shows us how much profit a business will make when they spend 1 dollar of equity.

- Dummy

In addition, the group also used a dummy variable COVID, representing the time when the Covid-19 epidemic appeared in Vietnam. Elnahass et al (2021) assert that the COVID-19 crisis has devastated many banks worldwide. Every country has had to implement certain policies to minimize the spread of the disease. The most prominent is implementing de-globalization by closing the border between

### 3.4. Descriptive Statistics

We collect 2 groups of data including: (i) Micro data of 19 banks for the period 2011 - 2022 from financial statements (ii) Macro data from the World Monetary Fund and the World Bank. world, the S&P Global dataset. Descriptive statistics of the variables in the model are shown in Table 2.

**Table 2: Summary statistics**

Variable	Obs	Mead	Std. Dev.	Min	Max
LLR	228	1.387719	0.472655	0.19	3.12
SIZE	228	19.11645	0.9900092	16.53	21.47
ROE	228	12.44	9.086617	-56.33	30.64
GDP	228	5.845	1.567093	2.56	7.98
INF	228	4.965	4.653564	0.63	18.68
Lrate	228	9.0775	2.972528	6.96	16.95
Prate	228	6.916667	2.74146	4	15
ONrate	228	4.11	3.413069	0.18	14.12
COVID	228	0.25	0.4339654	0	1

Source: Author's calculation from STATA

The study was checked the defects of the model including: (i) Multicollinearity test by VIF coefficient and shows that the model does not have multicollinearity phenomenon (ii) Hausman test shows that  $Pro > \chi^2 > 0.05$  thus accepting the random effects regression model as optimal; (iii) The variable variance test results in  $p\_value < 0.05$ , thus rejecting the hypothesis that the variance across entities is constant. (iv) Autocorrelation test results  $Prob > F < 0.05$ , thereby showing that the model has autocorrelation. Therefore, the research team used additional correction Cluster Robust SE to overcome defects.

### 4. FINDINGS AND COMMENTS

We use the Hausman test along with Cluster Robust SE calibration to handle the model's defects and shows that the optimal model for 3 data series about 3 different interest rates with (1) (2) (3) Lrate, Prate and ONrate are the fixed effect model, respectively.

*First, the panel data regression results indicate that the coefficient of the lending rate, policy rate, overnight rate variable is positive with respect to loan loss provision and statistically significant at the 1 percent level.* This finding is also in line with Khemraj and Pasha (2009), Farhan et al. (2012), Borio and Zhu (2012) who showed that when the lending rate increases, default risk on the balance sheets of banks rises. In particular, Borio and Zhu (2012) found that expansionary monetary policy in the long term will cause inflation which forces

central banks to raise interest rates to control inflation. Higher rates make loan repayment harder by increasing the interest burden of borrowers, which in turn, lead to higher loan default rates. An increase in NPLs can have a negative impact on credit institutions, particularly in terms of their ability to collect liquidity. Furthermore, if the increase in NPLs occurs within a particular economic sector or industry, it could pose a heightened risk to banks that are particularly exposed in that area. In such cases, the losses from NPLs could spill over to other banks and have broader implications for the entire financial system in the country. In the early years of the 21st century, many central banks around the world lowered interest rates in an attempt to stimulate economic growth. This led to an increase in lending by credit institutions and a corresponding increase in borrowing by consumers and businesses. However, when interest rates suddenly reversed and began to rise again, it put pressure on borrowers to repay their loans, which led to an increase in NPLs and bad debts. This, in turn, contributed to the financial crisis of 2007-2008, which had far-reaching effects on the global economy. Recently, due to COVID-19 pandemic interest rates were lowered by central banks encouraging credit institutions to increase lending until inflation starts to rise again, potentially leading to an increase in NPLs.

**Table 3: The impact of risk-taking behavior on LLRs**

	(1) LLR		(2) LLR		(3) LLR	
Lrate	0.192 [5.58]	***				
Prate			0.0626 [-1.41]	***		
ONrate					0.00610 [-0.36]	***
SIZE	0.165 [2.76]	***	0.0788 [1.33]		0.0842 [1.40]	
GDP	0.0339 [1.72]	*	0.0206 [0.82]		0.00378 [0.16]	
ROE	-0.0135 [-3.74]	***	-0.0137 [-3.56]	***	-0.0134 [-3.46]	***
INF	-0.106 [-4.97]		0.0409 [1.70]	*	0.0120 [0.98]	
COVID	0.227 [3.74]	***	0.200 [2.16]	**	0.247 [2.72]	***
_cons	-3.084 [-2.56]	***	0.112 [0.10]		-0.173 [-0.15]	***
N	228		228		228	
R-sq	0.105		0.087		0.088	
The table reports the estimated results using the Fixed Regression Model. The dependent variable is GDP economic growth. The standard error is in parentheses. ***, ** and * at the 1%, 5% and 10% significance levels, respectively.						

Source: Author's calculation from STATA

**Second, we find that the coefficient of the interaction bank size with LLR variable is positive at the 1 per cent level.** Lower interest rates can encourage banks to expand their lending activities and take on more risks, potentially leading to an increase in scale as well as NPLs. This is consistent with the findings of Astrini et al. (2014) and Barus and Erick (2016) that larger banks might have a higher bad debt ratio.

Larger banks often have broader lending capabilities and can lend with more significant amounts. However, they may also face higher financial risks and may need to make appropriate credit risk provisions to deal with potential risks, including NPLs. In Vietnam, the three big banks BIDV, VPBank, and VietinBank have always led the list of the largest bad debts among listed banks. Specifically, in 2022, VP Bank is the bank with the most bad debt with nearly VND 25,100 billion of bad debt. In which, most of them come from consumer finance company FE Credit, the bad debt of the parent bank in 2022 is just over 10,000 billion dong. Second is BIDV with the size of bad debt at 17,622 billion dong, up 30% compared to the end of last year. Another big bank, VietinBank, also ranked right after that in third place with the number of bad debts increasing by 10% compared to the end of 2021, to 15,726 billion dong.

**Another interesting result is the positive relation found between GDP growth and bank risk.** However, this result contradicts the findings of Salas and Saurina (2002), Fofack (2005), Jimenez and Saurina (2006), Khemraj and Pasha (2009), Mwegu (2015) who showed that growth economy has a negative impact on bad debt and loan loss provision ratio. Specifically, the authors argue that a strong economy with low unemployment and steady growth can help borrowers improve their financial situation, making it easier for them to repay their debt and limit the amount of bad debt. However, we found that banks and other lending institutions can be overly optimistic in their lending practices during strong economic times, leading them to extend credit to borrowers who may not be able to afford it. This optimism can lead to an increase in bad debt accumulation when economic conditions deteriorate or when borrowers face financial difficulties. Meanwhile, according to data from the SBV, credit balances of credit institutions increased from 121% of GDP in 2012 to about 142% of GDP in 2018, the strongest credit growth in 2016 with 18.2%. To ensure stability and reduce risks for credit institutions, with the goal of quickly and completely handling bad debts of credit institutions in the 2016-2020 period, the State Bank has developed and submitted to the National Assembly for approval Resolution No. 42. /2017/QH14 dated June 21, 2017 on piloting bad debt settlement of financial institutions (NQ 42) in order to quickly and completely handle bad debts of credit institutions and Decision No. 1058/QĐ-TTg approving the basic scheme restructuring credit institutions associated with bad debt settlement in the 2016-2020 period has helped the industry's bad debt ratio decrease from 10.58% in 2016 to 3.81% in 2020.

**In the case of inflation, we find that inflation has negatively impact on credit risk of banks.** This implies that high inflation can lead to currency depreciation, which may result in a decrease in the value of loan loss provisions. Moreover, when inflation is high, central banks may raise interest rates to control it. This could increase the cost of borrowing for banks, including the cost of the short-term loans. As a result, banks may find it more difficult to meet their liabilities and may face additional credit risk, as they could experience an increase in defaults on loans. The evidence is also in line with the findings of Hai and Duong (2021), Shao et al (2017) who argue that inflation has a negative impact on the risk provision ratio of credit institutions.

**Finally, the model also shows that the COVID variable has a positive effect on credit risk at the 1 per cent and 5 per cent levels.** This conclusion is consistent with the results of previous studies: Ratnovski and Lev (2020), Ahmed and Abedin (2021), Lawrence Kryzanowski (2023). COVID-19 has had a negative impact on many economic sectors, including credit risk. The COVID-19 pandemic has indeed led to a slowdown in the global economy and caused financial strains, resulting in increased risks to financial institutions and systems. The pandemic has disrupted economic activity across many sectors and caused widespread job losses, which has led to a rise in credit risk for banks and other financial institutions. According to the General Statistics Office, in 2020, Vietnam had 32.1 million people aged 15 and higher nationwide negatively affected by COVID-19. Those with income decreased to account for 69.2 percent, those with staggered working hours or

layoffs and rotating leave at 39.9 percent, and those having to quit working or stop their economic activity at 14 percent. Vietnam's working age unemployment rate for the whole year of 2020 is 2.48%, 0.31 percentage points higher than in 2019 and the highest in the past 10 years. By 2021, only in the second quarter of 2021, the whole country had 557 thousand workers lost their jobs; 4.1 million people had to suspend production and business; 4.3 million people have their working hours cut or forced to take time off from work or rotational leave; and 8.5 million workers lost income. During the outbreak of the COVID-19 pandemic, the labor market in Vietnam faced difficulties leading to an increase in unemployment and a decrease in income, so people and businesses may have difficulty in paying debts. The increase in the level of bad debt also means an increase in credit risk for financial institutions and banks. The labor market in Vietnam faced difficulties during the COVID-19 pandemic, with increases in unemployment and reductions in income for many individuals and businesses. Furthermore, the increase in bad debt due to difficulty paying debts may have led to an increase in credit risk for financial institutions and banks.

## 5. CONCLUSION

Based on quantitative modeling, research shows that credit institutions exhibit risk-taking behavior, and the pressure of non-performing loans is becoming increasingly prevalent. The non-performing loan ratio is trending upwards, which affects the effectiveness of credit institution operations and disrupts the achievements of restructuring phases for credit institutions in the 2016-2020 period. Therefore, the SBV needs to be flexible in using tools and measures to manage the risk-taking behavior of credit institutions as well as addressing non-performing loans.

To minimize risk and non-performing loans, the SBV needs to promote credit institutions to enhance supervision and risk management by utilizing risk prevention tools. This includes monitoring, assessing, and tracking changes in relevant risk indicators associated with loan portfolios. Thus, the intervention of the SBV is essential, including the use of economic tools such as: (1) Minimum capital adequacy ratio (CAR) tool: By applying this tool, credit institutions can ensure that they have sufficient capital to cope with potential risks and meet customer needs. It assesses and monitors the risk levels of credit institutions; (2) Tight control of minimum capital safety: This tool helps ensure that credit institutions maintain a minimum level of equity to cope with potential risks; (3) Short-term funding ratio and medium to long-term lending ratio: These economic tools are crucial for minimizing risk and maintaining the stability of the financial system. The short-term funding ratio ensures that credit institutions do not overly rely on short-term funding, enhancing their flexibility. The medium to long-term lending ratio helps ensure that credit institutions do not depend on short-term debt and reduce risks associated with short-term lending to customers. Other tools, such as risk threshold tools, interest rate adjustments, and managing liquidity, can also be utilized.

Secondly, the SBV should actively inspect and supervise banks, forecast risks, and ensure timely safety measures to prevent risks from occurring during an economic recession caused by the impact of the COVID-19 pandemic. To prevent risks during an economic recession, banks should implement effective risk management measures, monitor changes in market interest rates, and adjust lending rates accordingly. The SBV should also encourage banks to conduct comprehensive assessments of loan portfolios to identify and classify non-performing loans and implement measures to address them. Strengthening monitoring and inspection activities related to lending operations will help detect and address risks in a timely manner when crises occur, reducing the burden of dealing with potential risks.

To enhance supervision, it is recommended that the SBV use credit monitoring tools as an important means to monitor the credit situation and evaluate risks associated with approved loans. This tool ensures

that approved loans meet credit safety standards and enables the early detection of potential risks. Credit monitoring tools may include identifying indicators to assess credit risk (such as indicators related to borrowers' debt repayment ability, interest payment capability, and financial status), monitoring loan portfolios and borrowers, and analyzing credit trends. The credit monitoring system will support the SBV in early detection of high-risk loans, enabling preventive and timely actions. This tool is crucial in ensuring credit safety and financial stability in the face of shocks. Additionally, utilizing risk management tools for lending, such as COSO ERM (Committee of Sponsoring Organizations of the Treadway Commission Enterprise Risk Management) or ISO 31000 (International Organization for Standardization Risk Management), can assist the SBV in evaluating and managing credit risks and non-performing loans in the banking system in the post-COVID-19 period. Both frameworks provide systematic processes to identify and evaluate credit risks, and establish risk management measures to minimize their impact.

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## IMPACT OF ATTENTION INVESTORS ON FLUCTUATIONS IN THE VIETNAMESE STOCK MARKET

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**ABSTRACT:** *This research paper studies the impact of investors' attention on the operation and volatility of Vietnam's stock market in the period of 2018 to the present. More specific, we built a research model of investor interest on the basis of investors' online Google search behavior. Since then, we found that the SVI - index reflects the search volume on Google as a reliable representative of investor interest in stocks in particular and the whole stock market in Vietnam in general. Specifically, we also have shown that investor interest is strongly correlated with trading volume and is a significant determinant of liquidity, profitability and stock market volatility. Most importantly, this paper was conducted during a sample period even before, during, and after the financial crisis caused by the outbreak of the Covid-19 pandemic worldwide.*

**Keywords:** *Google search volume, SVI, investor attention, Vietnam stock market, liquidity of stocks, profitability.*

### 1. INTRODUCTION

Investor behavior is a combination of behavioral psychology effects and the perception and understanding of economics from which to make investment decisions. That behavior does not always follow the principles available but is subject to the influence of emotions, experience and practice. Therefore, in each case, each investor may have different levels of reaction to market fluctuations. From there, the attention of investors can affect volatility in the stock market. Specifically, the interest of investors is closely related to the total trading volume on the stock market. Empirical studies such as Barber (2007); Amal Aouadi et al. (2013); Yu Yuan (2015)... have shown that increased investor attention will increase the total volume of transactions. Besides, investor attention is often directly proportional to trading volume, specifically when a stock receives little investor attention, the trading volume of that stock decreases. In addition, changes in investor interest can affect the liquidity of each stock in the market (Seasholes et al., 2007); or the investment in advertising can also affect the liquidity and profitability of company shares (Chemmanur and Yan (2019)). Therefore, the attention of investors has certain impacts on the change of price and profitability in the market. With each level of stock and the state of the market, it leads to the increase or decrease of the price and the rate of profit. In addition, there are also many articles by experts who have conducted research on the above issue.

Since its establishment, Vietnam's stock market has always played the role of medium and long-term capital mobilization channel for businesses, with the number of individual investors accounting for a large proportion. In general, Vietnam's stock market in the last 5 years has a lot of fluctuations due to the impact of epidemics, wars... In 2020, the stock market declined sharply in the first phase of the year, but then thanks to the efforts of the Government and the state, the stock market indexes have grown again. Continuing after the upward momentum of the market in 2020, 2021 continues to be a sublimation year of Vietnam's stock market. However, this stock market has potential risks due to slightly hot and out of phase growth compared

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to the real economy, in the market, crowd psychology appears to go in a bad direction (Dr. Can Van Luc, 2021). 2022-2023 is a period full of expectations that the stock market will grow strongly again. Hence, it can be said that the Vietnamese stock market is subject to strong fluctuations by the psychology and behavior of investors. With limited time and effort, investors can only pay attention to such a limited amount of information that value-related information can sometimes be overlooked and temporary mispricing may occur. The lack of information has a great impact on the psychological development of individual investors with overreactions when unstable information appears, causing the stock market to face high instability factors. This is also the reason for the strong fluctuations of Vietnam's stock market in recent years with the overreaction of investors, especially individual investors to the uncertainties and less positive prospects in the world economy - politics in the post-Covid-19 period. In particular, at present, in Vietnam, there is relatively little research on the impact of investor interest on fluctuations in the Vietnamese stock market. It is easy to see that this is a new topic in Vietnam.

With the important role of the stock market as well as the characteristics of the Vietnamese market, the research team selected the topic *“Impact of attention investors on fluctuations in the Vietnamese stock market”*. In particular, we conducted an assessment of the impact of investor interest related to the level of liquidity and volatility of Vietnam's stock market. Specifically, the level of investor interest in the stock market and with each stock is assessed through the level of search information on Google of investors related to the stock market with each stock through the Google Trend index.

## **2. LITERATURE REVIEW**

### **2.1. Behavioral finance on attention investors**

In the face of the strong development of the stock market, more and more people are interested in the knowledge and scientific research in this field. Currently, most investors are more professional, know how to apply knowledge and analyze information to make the right investment decisions. Nonetheless, in the stock market, there are still many investors who make decisions based on emotions, based on the influence of external factors, so they make wrong investment decisions, thereby leading to losses and unintentionally creating negative effects on the market.

One of the most important theories of emotional investor behavior is the behavioral finance theory developed by Kahneman and Tversky (1979), De Bondt and Thaler (1990) and Shiller (2003). In particular, behavioral finance is a field of finance that offers theories based on psychological analyses to explain unusual movements in the stock market. Behavioral finance explains the collection and use of information and problem solving by individual investors, whereby individual decisions and market outcomes are influenced by the information structure and characteristics of market participants (Bakar and Yi, 2016).

Merton (1987) was one of the first studies to assess the impact of investor attention on stock market performance. Merton theorized that if investors avoided stocks they were unfamiliar with, the market for those stocks would be greatly diminished. Thus, the investor's attention has a significant impact on the liquidity and valuation of the stock. Research by Barber and Odean (2008) shows that stocks that attract investors' attention in relation to news, irregularities and fluctuations in profits, prices, trading in the market more will be traded relatively more than stocks that receive less attention.

Based on these studies, more and more recent limited attention hypotheses are developed in theoretical models such as those of Andrei and Hasler (2014), Hirshleifer et al. (2009). Specifically, Hirshleifer et al. (2009) point out that investors' reaction to information about the price and volume of stocks will be

weaker when investors are distracted, with low levels of attention, where distraction is measured by the number of simultaneous announcements. Similarly, Della Vigna and Pollet (2009) observed and compared the responses obtained by investors during and after the news releases on Friday with those observed when the announcements were made on weekends. The upshot is that investors' reactions to announcements and news on other days are weaker than they are on Fridays, as investors are often more distracted on the last working days of the week. More recently, Jank and Dimpfl (2011), Vlastakis and Markellos (2012), Kita and Wang (2012)... argue that investors' online search behavior has a significant impact on the volatility of stocks in developed markets.

In summary, over time, people have come up with the most general concept for behavioral finance theory, specifically, behavioral finance is a combination of psychology, economics and sociology. The theory of behavioral finance can be used to evaluate and explain the behavior of individuals and organizations investing in the stock market, in which, can giups learn and explain market anomalies based on concepts and theories related to sociology, psychology and economics such as susceptibility and misperceptions, different attitudes to risk, regret, overreaction to investor information. Investor behavior is a combination of behavioral psychology effects and the perception and understanding of economics from which to make investment decisions.

Investor behavior is a combination of behavioral psychology effects and the perception and understanding of economics from which to make investment decisions. Thus, in each case, each investor may have different levels of reaction to market fluctuations. To this day, the most studied important factors that influence investor decisions and stock market volatility are:

The first, representativeness and conservatism. Representativeness refers to making a judgment about a phenomenon based on a similar or similar phenomenon in the past when investors showed great interest in their previous beliefs. The reluctance to update beliefs stems from conservative tendencies. That's how conservatism was born. The evidence is that investors who are psychologically stuck with their data analysis in the past, react poorly to recent market news.

Second, self-assertiveness and overconfidence. Overconfidence refers to the fact that investors are very confident in their own judgment, analysis and stock valuation more effectively than relying on external information sources. Investors assume that any profitable win is the result of their own proper process of analysis and investment. On the contrary, when the investment is on the path to loss or not as they expected, they will blame external factors that have affected their investment. Self-assertion will make investors become overconfident and forget to evaluate the event in the most accurate and objective way. The tendency to self-assertion and overconfidence is correlated and the tendency to self-assertion is also a factor in forming and forecasting overconfidence. Self-assertive overconfidence leads to poor response to information in the market and overreaction to personal analysis. The confidence of investors increases, maintaining overreaction because they tend to blame all the mistakes on objective factors and believe absolutely in their success.

Third, adjustment and mooring. Anchor which determines whether the investment is accurate and reliable or not. On the other hand, choosing the correct anchor is based on the investor's own calculations and inferences. The initial anchor can be from a calculation, a present value, or some historical level. Anchors must be chosen correctly and appropriately for decisions and judgments to go in the right direction and be successful. Investors need to constantly make judgments about the value or purchase of a stock in the future.

Fourth, the confirmation trend. Investors tend to collect information that confirms their previous hypotheses rather than contradictory or unconfirmable hypotheses, more so when they deliberately misinterpret the available theories to support the confirmation of the hypothesis itself.

## **2.2. Measuring attention investors**

One of the biggest difficulties in measuring investor interest is the absence of an accurate measure of investor interest. Previous studies have suggested assessing investor interest indirectly through investor behavior when seeking information related to his or her investment decision-making. One of the proposed methods is the appearance of investment information in the media.

Antweiler and Frank (2004) use the volume of posts on Yahoo to represent the attention of investors and say that higher posting levels lead to greater volatility of stocks listed on the US market. Grullon et al. (2004) found that advertising costs have a positive relationship with the number of investors. Similarly, Boyd and Schonfeld (1977) showed that financial news ads can positively influence the value of securities by reducing the cost of seeking information or investor search behavior, changing investor preferences, or providing new information. Fang and Peress (2009) show a negative relationship between media coverage and stock market returns.

Another method proposed and used in recent studies is through internet search queries conducted through internet browsers such as Baidu, Yahoo and Google search volume. Da, Engelberg and Gao (2011) suggest that investor interest can be determined by seeking action because investors actively seek information to make investment decisions. As a result, the search volume index through Google Trend can be used as a direct measure of investor attention. Similarly, Drake, Roulstone and Thornock (2012) and Bijl, Kringhaug, Molnar and Sandvik (2016) all argue that Google search volume is an avowedly evidence for attention because investors are certainly paying attention to a stock that leads to informational behavior about that stock search.

## **2.3. The impact of attention investor on stock market volatility**

Drake et al. (2012) analyzed the Google search behavior of investors around the stock market and found that online search affects market valuation and facilitates price discovery. Similarly, Andrei and Hasler (2014) point out that the volatility of the stock market and the level of investor search through the Google Trend index have a simultaneous relationship with each other. Besides, Chen et al. (2021) pointed out that the interest of retail investors, as measured by Baidu search volume, has a significant positive impact in the short-term on the liquidity of future stocks. However, as the time period expands, this positive effect tends to weaken and eventually reverse after four weeks. More importantly, the short-term improvement in stock liquidity is mainly caused by the net buying activity of retail investors.

Tang and Zhu (2017) measured the increase in investor attention via Google search volume and found evidence that the level of investor search for information in a day is related to positive abnormal returns on the same day. By contrast, such a positive association between investor attention and stock returns quickly reverses after the first day. Adachi, Masuda and Takeda (2017) investigate the relationship between investor attention and stock price movements at Japan's startup stock exchanges, Mothers and JASDAQ. Research shows a positive relationship between search intensity and profitability and stock liquidity, especially in startups with a high percentage of individual shareholders. Colaco, Cesari, and Hegde (2017) also used Google search volume to represent retail investor attention and found that the increase in retailer attention after the initial filing but before the initial valuation was positively related to the initial valuation. A study conducted by Kim et al (2019) of the Norwegian stock market, found that Google searches did not correlate, nor could they predict, abnormal returns. Nevertheless, they found that increased Google search could predict increased trading volume and volatility. For developing markets, research by Shen et al. (2017) indicates that Baidu's search frequency can predict the next day's price change: stock prices rise when individual investors pay less attention to stocks, and fall when individual investors pay more attention

to stocks. Additionally, Lee A. Smales (2021) wanted to assess whether investor interest could account for stock returns across different sectors during the Covid-19 period. Research has shown that investors' interest in Covid-19 is increasing and has a negative impact on US stock profits. Relatively speaking, however, some sectors such as media, consumption, health and information technology may have benefited from this increased interest. Most recently, another study by Zhou and Lou (2023) on Chinese markets as investors are interested in the Russian-Ukrainian conflict and pointed out that investors' interest in this conflict contains more valuable information to predict the volatility of the Chinese stock market than some common predictors such as economic leverage, leapfrogging economic policies or political risks. Based on the research of Killian and Park (2009), Bampinas, Theodore and Georgios (2023) expanded further in the case of investors subjected to oil shocks and concluded that changes in investor interest can have a lasting and significant impact on stock market returns and oil prices, while investors often react strongly to shocks in oil prices and stock market returns of various intensities. These studies have confirmed Internet search activities as a direct representation of investor attention.

Consequently, it can be seen that investors' interest, trading volume of stocks and the level of stock volatility are proportional to each other and there is a strong correlation that helps investors make investment choices. According to the research team, so far, in Vietnam, there is very little research to analyze the interest of investors in the fluctuations of the stock market. This is the research gap that the team carried out in this study.

### 3. RESEARCH METHOD

#### 3.1. Research models

In this study, the research team assesses the level of investor interest towards two key factors when investors invest in the stock market, namely the liquidity of stocks and the volatility of stock returns. votes.

The model to evaluate the impact of investors' interest on the liquidity of stocks is shown as follows:

$$\begin{aligned} \text{ILLIQ}_{it} = & \alpha + \beta_1 \cdot \text{Ln}(\text{SVI}_{t,i-1}) + \beta_2 \cdot \text{Ln}(\text{SVI})_{M,t-1} + \beta_3 \cdot \text{Volatility}_{i,t-1} \\ & + \beta_4 \cdot \text{Return}_{i,t-1} + \beta_5 \cdot \text{Ln}(\text{Market Value}_{i,t-1} \\ & + \beta_6 \cdot \text{Tradding Volume}_{i,t-1} + \beta_7 \cdot [\text{Ln}(\text{Market Value}_{i,t-1} \\ & * \text{Ln}(\text{SVI}_{t,i-1}))] + \beta_8 \cdot \text{ILLIQ}_{i,t-1} + \varepsilon_t \end{aligned}$$

In which, similar to Goyenko et al. (2009) and Xiong et al. (2013), the research team measures the liquidity of the illiquid ratio of Amihud (2002)  $\text{ILLIQ}_{it} = \frac{|\text{Rit}|}{\text{TV}_{it}}$  where Rit is the rate of return of stock i in time t, TVit is the trading volume of stock i in time t.

The first explanatory variable chosen is the level of investor interest in the stock under consideration SVI<sub>i,t-1</sub>, and the investor's interest in the stock market in general SVI<sub>M,t-1</sub>. The next explanatory variable is Volatility<sub>i,t-1</sub>, which represents the volatility of stock returns. Next, the research team chooses Return<sub>i,t-1</sub> stock return. Return<sub>i,t-1</sub> stock return is calculated by dividing the natural base logarithm of the stock price at time t by the stock price at time t-1. Trading Volume is the number of units of a stock traded in a given period of time. Finally, the research team selected the explanatory variable as market capitalization Market Value. Market capitalization is the value of the total number of shares outstanding on the stock exchange of a listed company.

The model for assessing the impact of investors' interest on stock market volatility is shown as follows:

$$\text{VOL}_{i,t} = \alpha + \gamma_1 \cdot \text{Ln}(\text{SVI}_{t,i}) + \gamma_2 \cdot \text{Ln}(\text{SVI}_{M,i}) + \gamma_3 \cdot \text{Ln}(\text{Tradding Volume}_{i,t}) \\ + \gamma_4 \cdot \text{Ln}(\text{Return}_{i,t}) + \gamma_5 \cdot \text{VOL}_{i,t} + \varepsilon_{i,t}$$

Besides liquidity, volatility in profitability (VOL) is believed to have an impact on stock market performance. Volatility in earnings is a measure that shows the trend of changes in security prices over a period of time (Khositkulporn, 2013).

### 3.2. Research data

#### 3.2.1. Research data

The research team assesses the impact of investors' interest on the stock market in general, as shown by the VN-Index and the volatility of 15 stocks with the largest market capitalization on the stock market. Vietnam stock market as of the end of the first quarter of 2023. The data period is taken from January 5, 2018 to February 19, 2023 with a weekly frequency. . To ensure results are less biased, the team excluded stocks with less than 20 weekly search volume data. What's more, the team also eliminated stocks where SVI for eight consecutive weeks or more was zero. Additionally, Google insights allows the team to filter search volume so that only queries submitted within Vietnam are available. On the basis of these limitations, we end up with a sample consisting of 10 of the original 15 stocks.

**Table 1: List of stocks in the sample and search query**

COMPANY'S NAME		STOCK	SEARCH
Full company name	Abbreviated company name		
Stock exchange for shares of public companies listed by Ho Chi Minh Stock Exchange	VN Index	VNI	"VNI"
Stock exchange for shares of public companies listed by Hanoi Stock Exchange	HNX	HNX	"HNX"
Joint Stock Commercial Bank for Foreign Trade of Vietnam	Vietcombank	VCB	"VCB"
Joint Stock Commercial Bank for Investment and Development of Vietnam	BIDV	BID	"BID"
Vietnam Joint Stock Commercial Bank for Industry and Trade	Vietinbank	CTG	"CTG"
Vietnam Prosperity Joint Stock Commercial Bank	VP Bank	VPB	"VPB"
Vingroup Joint Stock Company	Vingroup	VIC	"VIC"
Vinhomes JSC	Vinhomes	VHM	"VHM"
MaSan Group Corporation	Masan	MSN	"MSN"
Vietnam Dairy Products Joint Stock Company	Vinamilk	VNM	"VNM"
Airports Corporation of Vietnam	ACV	ACV	"ACV"
PetroVietnam Gas Joint Stock Corporation	GAS	GAS	"GAS"

(Source: Compiled by the author's team)

### 3.2. Descriptive statistics of data sets

Table 2 shows descriptive statistics for SVI, where:

Mean is the mean of the distribution.

Skew is the kurtosis value to see if the distribution of the SVI variable is standard deviation.

The KURT value is the kurtosis value of the distribution. If SKEW is not 0 and KURT is not 3, then the distribution of SVI is non-normal.

In addition, Table 2 also reports the normality test statistics of Jarque–Berra (J–B).

**Table 2: Descriptive statistics report for SVI**

Stock	Mean	Skew	Kurt	J-B
VNIndex	31.8727	1.4004	2.8788	179.4737
HNX	41.8052	0.8160	1.2042	45.7621
VCB	46.5281	0.4801	0.0516	10.2861
BID	51.3258	0.2776	0.6075	7.5353
CTG	24.1086	1.4549	3.6067	238.9058
VPB	44.9850	0.6511	0.5085	21.7399
VIC	46.4494	1.1448	4.4369	277.3263
VHM	19.1822	1.4908	3.9901	255.3480
MSN	58.9812	-0.1700	-0.7377	7.3121
VNM	35.0827	1.3187	3.5745	218.7063
ACV	47.0301	0.7381	0.5902	28.0155
GAS	47.7594	0.7317	1.0696	36.4134

(Source: Compiled by the author's team)

## 4. RESULTS AND DISCUSSION

### 4.1. Model results

#### 4.1.1. Investors' interest in market liquidity

Prob probe values are presented as coefficient estimates.

\*, \*\*, \*\*\* indicate significance at the 10%, 5% and 1% levels, respectively.

**Table 4: Influence of investors' interest on the liquidity of securities**

Mã CP	VCB	BID	CTG	VPB	VIC	VHM	MSN	VNM	GAS	ACV
						0.961**		-1.763***		
		0.045*		-0.007*	-0.024*	-0.255*		-0.496***		-0.001***
	0.0002*				0.0001*					
	-0.035*			0.004*		0.016*		0.002*	0.019*	
		-0.01**	-0.006***	-0.001*	-0.013*				-0.032**	0.012**
					-0.006*	-0.028**		-0.05***		-0.0005*
	-0.0001*	-0.0001***	-1.52E-05***		-0.002***		-0.0002**	-0.0001*	-0.002***	0.002**
	-0.005*	-0.001*				-0.007*		-0.015***		
	0.145**	0.122*	0.255***	0.111*	0.183***	0.368***	0.167***		0.109*	0.371***
<b>R<sup>2</sup></b>	0.078	0.114	0.261	0.219	0.147	0.315	0.121	0.165	0.138	0.326
<b>Adj.R<sup>2</sup></b>	0.048	0.085	0.237	0.193	0.119	0.29	0.093	0.138	0.11	0.302

(Source: Compiled by the author's team)

#### 4.1.2. Investor interest and stock market volatility

Prob probe values are presented as coefficient estimates.

\*, \*\*, \*\*\* indicate significance at the 10%, 5% and 1% levels, respectively.

**Table 5: Influence of investors' interest on the volatility of Vietnam's stock market**

Mã CP	VCB	BID	CTG	VPB	VIC	VHM	MSN	VNM	GAS	ACV
		0.016**		0.011*		0.017***		0.021*	0.016***	
			-0.001*		-0.002*	-0.0002*	-0.003*		-0.004**	0.007**
		0.004**			0.004*		0.005**	0.0007*	0.006***	
	0.004**			0.004**	0.005***			0.001*		
				0.002*		0.001*			0.002*	
	0.225**	0.261***	0.229**	0.22***	0.284***	0.054*			0.262***	0.404***
R <sup>2</sup>	0.119	0.171	0.157	0.228	0.282	0.07	0.097	0.023	0.241	0.234
Adj.R <sup>2</sup>	0.084	0.141	0.123	0.198	0.252	0.029	0.057	0.022	0.211	0.201
QA	0.002	0.016	0.002	0.011	0.0009	0.017	0.001	0.021	0.016	-0.005

(Source: Compiled by the author's team)

#### 4.2. Discuss the results

The group's research results are consistent with the results of previous research papers. Amal Aoaudi, Mohamed Aroui, Frederic Teulon (2013) indicate that it is concluded that the level of investor attention has a negative impact on the illiquidity of stocks in the French market. In the research of Rimada Diamanta Putri, Pardomuan Sihombing (2020) also showed that trading volume has a negative impact on the liquidity of stocks, increasing trading volume will increase the liquidity of stocks in different markets. companies listed on the IDX Stock Exchange (Indonesia) for the period 2015 - 2019. However, contrary to the research of Jonathan Batten and Vo Xuan Vinh (2019), the research team believes that the market capitalization value has a negative relationship with the illiquidity of the stock, or with the larger the company, the higher the liquidity of the stock.

Overall, the team's findings confirm a key finding in the group's analysis based on the standard deviation of returns: that investor attention as measured by SVI is significantly associated with volatility in most returns. all cases. This confirms that the team's findings are accurate and consistent with the results of previous research papers. Malgorzata Just and Krzysztof Echaust (2020) show that there is a positive relationship between returns and volatility of stock returns, the higher the return, the lower the volatility of returns and opposite. Similarly, Yousaf and Yarovaya (2022) show that trading volume has a strong and positive relationship. Increased trading volume will increase the volatility of the stock's rate of return. Brochado A, 2020 believes that the level of investor interest has a close relationship with the volatility of stock returns, especially in times of economic crisis.

#### 5. CONCLUSION

Through the above study on the level of investor interest and activities on the Vietnamese stock market, the group can draw some conclusions, specifically as follows:

Firstly, the larger the companies, the more liquid the stock will be and vice versa.

Second, the higher frequency of searching for information related to the online market is due to increased uncertainty among investors, increasing liquidity.

Third, stocks that receive more attention will be prioritized to trade in relatively larger numbers than stocks with less attention.

Fourth, online search volume is strongly correlated, reflecting investor interest.

Fifth, past returns can reflect market interest and volatility through Google search volume.

Through the research paper, the research team has contributed to the existing literature that confirms that investor attention is a determinant of stock market performance and volatility. Although previous studies have mainly focused on stock markets of developed countries such as the United States, the European Union (EU), China... but the first group chose to use the data of Google and the Vietnamese stock market.

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## THE IMPACT OF TRANSACTION ACCOUNT'S ZERO FEE POLICY ON THE PERFORMANCE OF COMMERCIAL BANKS IN VIETNAM

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*ABSTRACT: Transaction accounts are one of the most popular services to satisfy the customers' need for cash transactions, money transferring and other financial transactions. These used to be the banks' main source of fee income, including account opening fees, maintenance fees, transaction fees. . . . Recently, competition in digital banking services led to a trend in waving fees on transaction accounts in order to attract new customers. The zero free policies can be in form of un-conditional free transaction accounts applied for all types of users and conditional free transaction accounts applied for customers satisfied certain conditions. It is undeniable that the waives of transaction account fees have brought some losses to the banks' fee income. However, the banks may benefit by attracting new customers, reducing cost of funds (cause the balances on transaction accounts are consider as low cost of funds), increasing cross-selling. . . . To this point, there's no research findings on the impact of zero fee policy to the overall banks' performance. The study focuses on assessing the impact of the free payment account policy on the financial and operational results of commercial banks in Viet Nam in the period of 2011 - 2021. Using combined qualitative and quantitative method, the study estimates the impacts of free payment accounts to banks' ROA and ROE using balanced panel data from 18 Vietnamese commercial banks with regression model like OLS, fixed-effects and random effects regression model, adjusted with FGLS method. The results show that the application of both unconditional and conditional free policy of transaction accounts have positive impacts on the bank's financial performance. The impacts of free transaction accounts on non-financial performance with interview methods have found considerable effects in increasing brand reputation, expanding customers and increasing competitiveness. The study suggests an effective fee policy for payment accounts of commercial banks.*

**Keywords:** zero fee policy; transaction account; banks' performance; commercial banks.

### 1. INTRODUCTION

In the 21st century, the development of 4.0 industry revolution has affected all aspects of human life, especially the way financial transactions are performed. Transaction accounts have also changed drastically, from electronic identification technology (eKYC), security technology, new payment methods (QR code), contactless card to the features of ordering, paying and performing financial transactions...to bring outstanding experiences to customers. row. Banks also waive all fees (accounts opening fees, accounts maintenance fees, fees for performing transactions on accounts ...) to attract clients. In Vietnam, the trend of zero fee, which was started by Vietnam Technological and Commercial Joint Stock Bank (Techcombank) in 2016, has made an important contribution to making the transaction accounts products more popular and promoting non-cash payments in the economy. The benefits and losses of banks' transaction accounts' zero fee policy are still the matter of debate. Obviously, transaction accounts' zero fee (including unconditional and conditional free policy) will reduce fee income of commercial banks. On the other hand, this can be offset by opportunities to attracting low-cost sources of fund, cross-selling products, attracting and retaining customers. The previous studies show that the problem of the benefits and losses of fee income has not yet been clearly solved. Therefore, this study focuses on solving the question of how transaction accounts' zero fee policy affects the financial and non-financial results of commercial banks? Using quantitative method

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through regression models, using panel data collected from financial statements of 18 commercial banks with the largest capital scale in the market in the period 2011-2021, combined with qualitative methods through interviews with bank experts in 2021, the results found that the transaction accounts' zero fee policy has a positive impact on financial results and some non-financial results of commercial banks.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Fees and transaction accounts**

Studies have shown that service fees are one of the important factors in attracting customers. Fee income is a stable source of income, contributing significantly to commercial banks' profits. Nowadays, fee per transaction can be drastically reduced thanks to automation and modern technology adoption. Related previous studies give the following results.

DeYoung & Rice (2004) suggested that when customers make transactions, banks will receive fees, and increase their non-interest income. Recently, advances in technology have allowed banks to provide their financial services more efficiently, reflecting in the reduction in cost per transaction, increasing convenience for customers, and also total fee income for banks. More specifically, due to the introduction of new distribution channels, such as ATMs and online banks, customers are willing to pay service fees, in exchange for their convenience. As a result, the fee revenue of banks increases (DeYoung and Rice, 2004). Mateus Feld et al. (2021) also showed that as electronic banking services develop, the cost of banks can decrease. In addition to the benefits of efficiency and practicality, technology also contributes to reducing the costs that customers pay to the bank.

Kashian.R & Drago.R (2016) studied non interest checking accounts (NICs) of banks from 2008 to 2012 and stated that customers with NICs need a minimum balance to avoid fees. Compared to large banks, NICs holders at small banks have more privileges. Large banks often do not waive fees and impose high minimum balances on customers' accounts, while small banks are more likely to offer free NIC accounts. The words 'free account' can create an aura of goodness (Nisbett and Wilson, 1977), resulting in a positive review of banking from the customer's side. Tyler Spaid & Mike Branton (2013) researched free payment accounts based on the relationship between customer and bank and suggested that customers would be free of payment accounts if guaranteed specific conditions such as a large account balance, being a regular bank debit card or other service users. Teplý (2015), Giordani et al. (2009) reviewed the online banking services of Greek commercial banks. The authors also present the related costs and fees that customers pay when using these services. The findings show that there is a disparity in the fees that Greek commercial banks impose on their customers for conducting internet banking transactions. However, banks cannot reduce the cost of providing online services because they have to invest in facilities to support customers. Thus, these costs are transferred to the customer in the form of fees for using the services (Keeton, 2001). Bergendahl and Lindblom (2007) report that Swedish banks do not charge paper and electronic payments. However, they charge a fixed annual fee for customers using paper banking and electronic banking services. The more transactions are made using the online method, the lower the fee.

Nguyen Van Chien, Pham Thi Minh Thuy (2021) indicated that the number of transaction accounts has an impact on performance of banks. The increase in both quantity and quality of transaction account has positive impact on bank's performance. Transaction accounts are one of the services of electronic banking Sullivan (2000). At the same time, it helps banking operations become more professional, helps reduce operating costs, saves human resources, thereby increasing profits. In addition, the development of

electronic banking services (including transaction accounts products) helps increase customer satisfaction and retention in the retail banking sector. Similar research by Angelakopoulos & Mihiotis (2011) showed that e-banking services and technologies provide the banking industry with several opportunities to attract new potential clients.

## **2.2. Results/performance of commercial banks**

There are a number of studies on commercial bank's operational effectiveness, among which some are highlighted: Dawood's (2014) studied on the effects of micro-factors on the operational efficiency of 23 commercial banks in Pakistan (2009 – 2012). ROA is the only dependent variable, while Equity Rate on Total Assets, Total Asset Scale, Rate of Recovery on Total assets, Liquidity Capacity and Cost-to-Income Rate are independent variables. The percentage of capital raised on total assets, the total asset scale and the share of equity on total assets all affect the ROA in the same direction. The other two variables have an inverse effect on ROA. Ramadan Kilani and Kaido Mi (2011) studied the factors affecting the performance of the banking system in Jordan in the period 2001-2020. The author uses two dependent variables: ROA and ROE, while dividing into three groups for independent variables bank specific variables (Scale, Loan outstanding, Total Credit Risk, Equity capital on Total asset, and Cost to Income ratio), industry environment variables (Total banks'assets to GDP, level of concentration of the three largest banks) and macro-environment variables (GDP growth rate and CPI inflation rate). Nguyen Viet Hung (2008) study of the operational efficiency of Vietnam's commercial banks in the period 2001-2005 showed that the variables Deposit Rate on Loans, Level of Market Concentration, Equity ratio to total assets and variables on changes in the macro environment, banking technology have the same impact as the results of the bank's operations. Meanwhile, the remaining variables of interest income on total income, borrowing on total assets have the opposite effect.

From related studies, it can be noted that transaction accounts are one of the "must - have" products of commercial banks and transaction account fees used to be one of banks' important sources of income. However, there are not many studies directly assessing the impact of free transaction accounts on the performance of commercial banks. These studies mainly examine the role of transaction accounts on several aspects such as customers attraction and satisfatiton, costs reduction. There is no study that comprehensively assessed the impact of free transaction account on both the financial and non-financial outcomes of commercial banking, especially in the context of post Covid-19 period.

## **3. RESEARCH METHOD**

### **3.1. Quantitative methods**

To assess the impact of free transaction accounts on financial results, the study used a quantitative research methodology based on 02 models:

Model 1: Study the impact of transaction account's zero fee on the bank's financial results (unconditionally free policy, applicable to all customers with transaction accounts).

Model 2: Study the impact of transaction account's zero fee on the bank's financial results (conditionally free policy, only applicable to clients who satisfy certain criteria).

Inheriting the results of preliminary research and filtration in accordance with the conditions of the figures as well as characteristics of Vietnamese commercial banks, the author proposed to build a model for assessing the impact of free transaction accounts on the performance of commercial banks, as follows:

$$Y = \beta_1 + \beta_2 \times MP\_TK_{it} + \beta_3 \times Size_{it} + \beta_4 \times TyleTGKH/TTS_{it} + \beta_5 \times LDR_{it} + \beta_6 \times TyleCasa_{it} + \beta_7 \times CI_{it} + \beta_8 \times Equity_{it} + \beta_9 \times GDP_{it} + \beta_{10} \times CPI_{it} + e_{it} \quad (1)$$

$$Y = \beta_1 + \beta_2 \times MP\_DK_{it} + \beta_3 \times Size_{it} + \beta_4 \times TyleTGKH/TTS_{it} + \beta_5 \times LDR_{it} + \beta_6 \times TyleCasa_{it} + \beta_7 \times CI_{it} + \beta_8 \times Equity_{it} + \beta_9 \times GDP_{it} + \beta_{10} \times CPI_{it} + e_{it} \quad (2)$$

Y is a measure of the performance of commercial banks, including the dependent variables ROA, ROE

In the independent variables in the model, the variables are divided into 3 groups: bank specific factor, macro factors and free transaction account factor. Bank specific factors include: Bank size (SIZE), Customer deposit/Total asset ratio (TyleTGKH/TTS), Casa/Total assets ratio (CASA/TTS), Loan to deposit (LDR), Cost/Income (CI), Total equity/Total assets (VCSH/TTS). Macro-factors includes GDP growth rate (GDP) and inflation rate (CPI). The free transaction accounts variables are dummy variables, which are included to assess the impact of free transaction accounts on the bank's financial index, including the unconditional fee transaction account variables (MPTK) applicable to Model 1 and the conditional free transaction account variable (MPDK) applied to Model 2.  $E_{it}$  is called the model error.

The study used POOL OLS models, Fixed Effects Model (FEM), Random Effects Model (REM) to quantify the impact of free transaction accounts variables on bank profits, using Stata software for balance sheet data with 190 observations of 18 banks over 11 periods of time (years). The data collected from the financial statements of 18 commercial banks with the largest capital scale in the Vietnamese. To select the most suitable model, the study used Hausman accreditation. The subsequent model selected will be tested theories, including multi-common line verification, variability verification (Breusch and Pagan Lagrangian verification) and self-correlation (Wooldridge verification), and the shortcomings of the model will be corrected by Atiken's general minimum equal estimate (FGLS) (1936).

**Table 1. Variables in the model**

Symbol	Variables	Expect	References
Dependent variable			
LAGROA	Net income/Total assets ratio (Lag variable)		Dawood (2014), Ramadan Kilani & Kaido Mi (2011)
LAGROE	Net income/Total equity (Lag variable)		Kilani & Kaido Mi (2011)
Independent variable			
SIZE	Bank size (Logarithm of total assets)	+	Anbar & Alper (2011), Nguyen Van Thep & Liu (2020)
CI	Cost/Income	-	Sahyouni & Wang (2019)
LDR	Loan to Deposit	+	Rengasamy (2014), Buchory (2014)
TyleTGKH/TTS	Customer deposit/Total asset ratio	+	Alper & Anbar (2011)
VCSH/TTS	Total equity/Total assets	+	Shamki, Alulis & Sayari (2016)
CASA/TTS	Casa ratio	+	The research team proposed
GDP	GDP growth rate	+	Widyaningrum & Siswanto (2014)
CPI	Inflation rate	+	Guru & et.al (1999)
Dummy variable			
MPTK	Unconditional free transaction account	+	The research team proposed
MPDK	Conditional free transaction account	+	The research team proposed

Source: The research team collected.

### 3.2. Qualitative method

The study used an interview method to evaluate the impact of transaction account’s zero fee policy on non-financial result. The survey was conducted with 141 bank experts who had at least one year of work experience. This method is used to explain the results of quantitative models, identify the benefits of commercial banks, evaluate factors affect to free transaction account. The results obtained from expert interviews help to more comprehensively. Analytical studies based on two indicators are the average score and the standard deviation. The average score is calculated according to the per capita of rights, also known as the common average of rights - is the average value plus reflecting reliability, the quantity is only the frequency of repetition. Standard deviation is an indicator used to measure the extent to which a data set is spread around an average value.

## 4. RESULTS AND DISCUSSION

### 4.1. Results

#### 4.1.1. The impact of transaction account’s zero fee policy on the financial performance of commercial banks.

Hausman test showed that p value < 0.05, the fixed effects model (FEM) is suitable. The FEM model has all VIF coefficients smaller than 3, showing the model has no multicollinearity (Nguyen Quang Dong and Nguyen Thi Minh, 2013). The results of the Breusch and Pagan Lagrangian tests and the Wooldridge tests show that the model has heteroskedasticity and autocorrelation. To remedy the shortcomings of the model, the study used Feasible generalized least squares (FGLS) (Aiken, 1936) to restructure the FEM models.

**Table 2. Results after correction using the FGLS method**

	LAGROE	LAGROA	LAGROE	LAGROA
MPTK	3,009*** [2,70]	0,388*** [4,08]		
MPDK			2,639** [2,29]	0,364*** [3,72]
SIZE	1,437 [0,80]	0,295* [1,95]	1,417 [0,79]	0,296** [1,98]
VCSH/TTS	-52,45*** [-2,85]	5,330*** [3,41]	-49,71*** [-2,70]	5,748*** [3,69]
TyleTGKH/TTS	0,840 [0,21]	-0,483 [-1,40]	0,108 [0,03]	-0,542 [-1,56]
CASA/TTS	7,000** [2,08]	0,665** [2,44]	7,352** [2,17]	0,696** [2,54]
LDR	0,8040*** [3,03]	0,00610*** [2,61]	0,0817*** [2,91]	0,00587** [2,49]
CI	-0,143*** [-3,40]	-0,00750** [-2,28]	-0,148*** [-3,47]	-0,00786** [-2,35]
GDP	-0,319 [-1,44]	-0,0312* [-1,78]	-0,302 [-1,34]	-0,0292 [-1,64]
CPI	-0,0293 [-0,33]	0,00169 [0,24]	-0,0409 [-0,46]	0,000683 [0,10]
N	190	190	190	190
R-sq				

Source: Stata

Note: \* p < 10% \*\* p < 5% \*\*\* p < 1%

The results showed that factors have a strong impact on ROA and ROE include the MPTK: The LDR ratio (which has the same directional impact on the ROA as well as the ROE with the significance of 1%);, the VCSH/TTS ratio (with the opposite significance to the ROA but the same significance with ROE at the same meaning of 1%), the CI (with a reverse effect to the ROA and the ROE at the significant level of 1%). The CASA/TTS ratio affects both ROA and ROE in the same direction with a significance of 5%.

The impact model of free conditional transaction account to ROA, ROE, the MPDK has the same directional impact to both ROA and ROE but has a stronger degree of significance to the ROA. The LDR ratio, VCSH/TTS ratio, CI ratio, CASA/TTS have an impact on ROA and ROE with dimensions and significance levels similar to the above model. This may explain that both the free unconditional transaction account and free conditional transaction accounts have a more positive impact on the profitability of commercial banks. The act of entirely free helped attract customers to use services, increase cross-sales of products and increase cheap capital from non-term deposits (CASA)...Therefore, banks can compensate for the profits that had to be sacrificed for reducing the source of service fees.

Some banks have free conditions for VIP customers, customers need to have a large minimum balance or a level of regular transaction execution. As we can see, attracting new customers is not the main goal of free. Besides, these banks want to use fees as an additional incentive for client care, thereby increasing the loyalty of VIP customers. It can be seen that free services are an inevitable trend in the process of competition and development of the modern financial system. The results of the study were similar to those of Russell Kashian & Robert Drago (2016), Mateus Feld and colleagues (2021) and Nguyen Van Chien, Pham Thi Minh Thuy (2021).

#### 4.1.2. The impact of transaction account's zero fee policy on the non-financial performance of commercial banks.

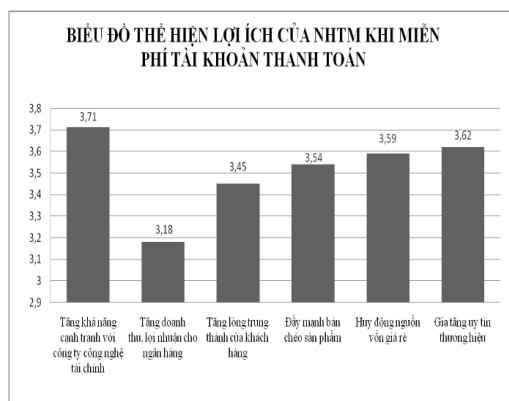


Chart 1a: Benefits of commercial banks when free transaction account

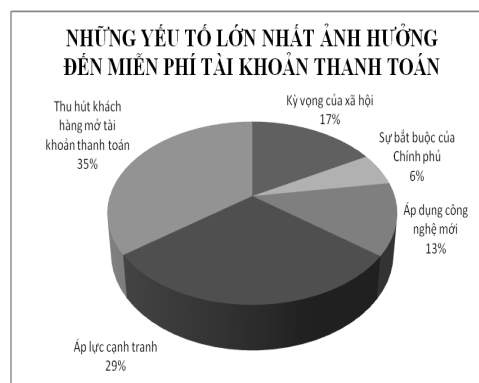


Chart 1b: The biggest factors affect free transaction account

Source: Survey results of the research team in April 2022

The results of the survey showed that the majority of bank experts interviewed believe that free transaction accounts have a positive impact on the performance of commercial banks in Vietnam. The free transaction accounts increase the bank's competitiveness with financial technology companies (3.71 points), improves the image and increases bank's brand reputation (3.62 points), helps bank mobilize cheap capital sources (3.59 points), boosts cross-selling products (3.54 points), increases customer loyalty (3.45 points). However, the benefits increased revenue and profit are the least agreed with bank officials with an average of 3.18.

The majority of bank officials chose attracting customers to open a transaction account as the biggest motivator, with 35.1% of respondents agreeing. Competitive pressure is the second-largest driver (with 29.6% of opinions in agreement). Social expectations (16.9%) and opportunities from the adoption of new technologies (12.7%). The government's obligation in the request for exemption, the reduction of transaction accounts fees to support the people is the weakest motive (5.7%). Because, before there was this requirement of the government, there were several banks that pioneered the free account (Techcombank is started free from 2016, while TPBank started free from 2019 and until the time since the pandemic there are 17 banks have also started free).

#### 4.2. Discussion

It can be seen that the transaction accounts' zero fee policy at commercial banks is still effective at the present time. However, it is necessary to look objectively as the number of free banking accounts increases. The benefits of having free transaction accounts will decrease as clients will see that free is no longer the different factor that helps attract customers to choose a transaction account. Trending free transaction accounts in the near future is only really effective if the bank has a proper pricing and fee policy. In order to be able to further improve the efficiency of banks when free transaction accounts and meet the increasing needs of customers, banks should pay attention to the following solutions: develop a reasonable non-term interest rate policy for customers; carefully calculate the overall benefits from customers; promote cross-sales of products; improve comprehensive client care services; modernize technology and processes to minimize transaction costs, manage operating costs effectively.

#### 5. CONCLUSION

The research set out to investigate the impact of transaction account's zero fee policy on the performance of commercial banks in Vietnam. This study show that free transaction account has been a popular trend in commercial banks over the years. Research indicate that free transaction accounts have brought both financial and non-financial benefits to commercial banks. Although there are some limitations due to the size of the new study sample limited to the 18 commercial banks. However, the research team also hopes the paper may suggest commercial banks fee policy for further research.

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## THE IMPLICATION OF MACHINE LEARNING TECHNIQUES FOR FINANCIAL SOLVENCY PREDICTION AN EMPIRICAL ANALYSIS ON VIETNAMESE LISTED ENTERPRISES

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**ABSTRACT:** *The study aims to predict short-term and long-term solvency of Vietnamese listed enterprises. The authors use a standard model with Linear Regression method and 3 supervised learning techniques: KNN (K-nearest Neighbor), Decision Tree and Random Forest. Through the analysis and evaluation, KNN is the best forecasting technique and has improved over the linear regression model. The research results indicate that KNN and Random Forest are good at predicting solvency, but they do not have improvement over the regression model. Additionally, almost techniques have good scores when forecasting Cash ratio and TD\_TA. After that, the authors proceed to split the data set into 8 separate industries. It can be seen that Information Technology (IT) has the highest accuracy when predicting solvency. By way, conclusions can be drawn that can be applied to understand the application of machine learning models to predict solvency for enterprises.*

*Keywords: solvency, machine learning, micro and macro factors, Viet Nam*

### 1. INTRODUCTION

In finance or business, liquidity is defined as the amount by which an individual's or organization's current assets exceed its current obligations. Solvency is one of the indicators used to analyze an enterprise's financial capacity, indicating its ability to satisfy its liabilities at any moment. Strong financial capacity indicates great solvency; the company always has adequate funds to pay its debts on time. When a company's financial capacity is limited, it faces numerous obstacles, including the inability to pay its debts. There are numerous dangers that could lead to insolvency in the future, influencing the enterprise's reputation, scale, character, and current operational position. A protracted challenging position without a remedy will lead to the company's demise.

As a result, anticipating company solvency is a critical task in identifying the financial risks that firms confront. At the same time, it serves as the foundation for quickly addressing problems when solvency is low. Furthermore, the solvency forecast is used by businesses to analyze their current position in the commercial market. Assisting investors, suppliers, and banks in determining a company's ability to pay its payments on time. To reduce risks, make investment, collaboration, and loan decisions. Currently, research on forecasting enterprise solvency is sparse and not frequently used. It is critical to undertake research on the factors influencing enterprise solvency using relevant and practical approaches. The study intends to forecast the solvency of Vietnam's listed enterprises. It is clear that firms can self-assess their financial capacity and credit risk management, as well as decide the best business strategy. Simultaneously, it serves as a source of information to assist investors, credit institutions, and partners in making sound investment and lending decisions.

Based on domestic and international research on the impact of several factors on the solvency of publicly traded companies. Solvency is influenced by both internal corporate characteristics and economic

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factors, which are classified as micro factors and macro ones. Micro factors include return on asset, debt ratio, assets and so on. Macro factors include inflation rate, gross domestic product and interest rate.

The research employs both qualitative and quantitative methodologies. The authors employ synthesis, analysis, and comparison methodologies to determine the current solvency of listed firms. Furthermore, the authors employ machine learning to forecast the solvency of organizations. It is a branch of artificial intelligence (AI) and computer science concerned with the development of strategies that enable systems to learn automatically from data in order to tackle specific issues.

## **2. THEORETICAL FRAMEWORK**

The solvency of enterprises can be highly evaluated based on influencing factors. Through domestic and foreign research, the authors synthesize and classify the influencing factors into two main groups: micro factors and macro factors. The specifics are as follows:

### **2.1. Micro factors**

A micro factor is a group of factors belonging to the enterprise; studies often focus on financial indicators such as firm size, return on assets, return on equity, net profit margin, return on sales, asset growth, revenue growth, and some other factors.

#### **Return on asset (ROA)**

In their studies, Bruinshoofd and Kool (2004), Waqas Bin Khidmat Mobeen Ur Rehman (2014), Dang Thu Hang (2020), Truong Thanh Hang et al. (2020), and others discovered a negative correlation between company solvency and many factors. In order to evaluate the variables impacting solvency, Bruinshoofd & Kool (2004) used data from more than 450 businesses operating in the Netherlands between 1986 and 1997 as the basis for their research sample. The return on assets has a detrimental effect on the viability of the company, as the authors have demonstrated. A similar study has been done in Vietnam by author Dang Thu Hang on 6,700 observations, which are data gathered from companies registered on the Vietnamese stock exchange between 2008 and 2019. The results indicate a negative relationship between solvency and ROA. On the contrary, Tran Manh Dung and Nguyen Nam Tai's (2018) research came to a different conclusion. The authors' analysis of data from 31 food processing companies registered in Vietnam between 2012 and 2016 revealed that the rate of return on total assets has a positive impact on the business's short-term viability. When the study is based on businesses in Ghana, the results of Issaq and Bokpin (2009) are comparable.

#### **Return on equity (ROE)**

Author Waqas Bin Khidmat Mobeen Ur Rehman (2014) conducted an empirical analysis on data gathered from 10 chemical businesses registered in Pakistan over the course of the previous year for return on equity (ROE). According to research, there is a negative relationship between ROE and an organization's solvency. In addition, researchers in Vietnam led by authors Tran Manh Dung and Nguyen Nam Tai (2018) reached the identical conclusion that return on equity has a negative impact on an enterprise's ability to pay down short-term debt. In order to identify the key elements influencing the solvency of joint stock commercial banks in Vietnam, authors Dang Thi Quynh Anh and Tran Le Mai Anh (2022) gathered information from the financial statements of 15 banks for the years 2009 to 2020. Similar to the results of the author Dang Thu Hang's previous studies, it is determined that profitability, equity, and solvency have a favorable link.

#### **Debt ratio**

Regarding the debt ratio, a number of studies conducted abroad suggest that this element has the opposite impact on a company's solvency. In a 1999 study, Opler and colleagues examined the variables

that affected 1,048 U.S. banks' solvency between 1971 and 1994. They discovered that the rate of debt had a detrimental effect on solvency. In addition, from 1987 to 2000, the researchers for Ferreira & Vilela (2004) examined data from 400 enterprises in 12 member nations of the European Economic and Monetary Union (EMU). The findings demonstrated an adverse relationship between a company's ability to pay and its pace of debt accumulation. Other authors have reached the same conclusions as Afza and Adnan (2007), Chen and Mahajan (2010), and Gill and Mathur (2011). Additionally, several researchers around the nation who did their own studies also pointed to similar results. Chen Van Hai (2021) collected data on 48 listed securities companies in Vietnam from 2012 to 2019 and analyzed it, finding a negative correlation between the debt ratio and short-term payability, similar to the authors Tran Manh Dung and Nguyen Nam Tai (2018), who studied food processing firms in Vietnam.

### **Assets**

The solvency of the company is impacted by a number of variables, including asset size, asset growth, revenue growth, and more. This is a factor that is frequently mentioned in study articles when it comes to business scale. The size of the firm had a positive effect on solvency, according to research conducted by Afza and Adnan (2007) on 205 firms in Karachi, Pakistan, from 1998 to 2005. Other research groups such as Isshaq and Bokpin (2009), Haan and Kakes (2010), Filippo Ippolito and Ander Perez (2011), Joo (2013), Ambarwati and Hasib (2018), Tran Manh Dung and Nguyen Nam Tai (2018), Zhong Thanh Hang and colleagues (2020), Tran Van Hai (2021) when conducting research on different datasets, also concluded that the size of the enterprise and the ability to pay have a correlation in the same direction.

Meanwhile, the size of the firm has a negative impact on solvency, according to the research team of writers Dang Thi Quynh Anh and Tran Le Mai Anh (2022), who used data from 15 Vietnamese commercial banks with significant scale and market dominance between 2009 and 2020. The conclusions of several other investigations, including those by Opler and colleagues (1999), Ferreira and Vilela (2004), Verma (2014), Kumar (2016), Siti Rahayu Ningsih and colleagues (2021), V Th Snow Russia (2019), and Pham Ngoc Van (2021), are consistent with this one. In order to evaluate the solvency of businesses through impact variables, two writers, Chen and Mahajan (2010), studied 45 nations between the years of 1994 and 2005 for the ratio of capital circulation and found that the debt ratio has a reverse correlation. Similar to this, Gill & Mathur (2011) found that a number of factors, including the rate of liquidity, had a detrimental impact on the solvency of 164 companies listed on the Toronto Stock Exchange between 2008 and 2010. Isshaq & Bokpin (2009) analyzed data in Ghana from 1991 to 2007 to examine the relationship between solvency and impact variables, contradicting the previously mentioned conclusion. When the study was based on data collected from 23,000 U.S. corporations over a seven-year period, starting in 2002, the research results supported the observation of Filippo Ippolito and Ander Perez (2011) that the rate of movable assets had a positive association with solvency.

### **Other factors**

Other aspects of an enterprise's assets, such as investment capital, as determined by studies by Bruins Hoofd and Kool (2004), Gill and Mathur (2011), and the structure of assets by Zhang Qing Heng et al. 2020, demonstrate an inverse relationship with solvency. Additionally, Baum et al. 2008 established a correlation between asset growth determinants and the company's solvency. Also, a number of studies have drawn conclusions concerning factors that positively affect an enterprise's ability to pay its debts, including those on fast payment rates by Zhong Qing Hui et al. 2020, Tran Van Hai (2021), and capital security rates by Eissa A. Al-Homaidi and Associates (2019) and Faruque Ahamed (2021).

## **2.2. Macro factors**

Besides micro factors, some studies use variables belonging to the group of macro factors, such as interest rates, inflation, and GDP growth, as control variables.

### **Inflation rate and Gross domestic product**

Two factors, the inflation rate and the GDP growth rate, are mentioned in the study of Tran Van Hai (2021). The author has collected data on 48 securities companies listed in Vietnam in the period from 2012 to 2019 and analyzed it; however, in the process of data processing and model building, the author has These variables were excluded due to concerns about autocorrelation. The same thing happens in the study of Tran Manh Dung and Nguyen Nam Tai (2018), who argue that GDP growth and inflation have no impact on the solvency of enterprises. On the other hand, some studies have shown that GDP growth and inflation have an impact on solvency. Author Dang Thu Hang (2020) has conducted empirical research on listed companies in Vietnam and shows that GDP growth has a positive correlation with solvency, but the inflation rate has no relationship. The relationship to the research variable is similar to the two studies on Faruque Ahamed (2021), which also suggest that GDP growth has a positive effect while inflation negatively affects the payment risk of banks. trade in Bangladesh. On the other hand, the authors, Eissa A. Al-Homaidi et al. 2019, came to the opposite conclusion when the study was based on data from commercial banks in India through fixed-effects models. Both determined and random factors have determined that the GDP growth rate has a negative effect on bank solvency, while the inflation rate has a positive correlation.

### **Interest rate**

The interest rate factor is also mentioned in a number of foreign and domestic studies. Pavla Vodová (2011) conducted an empirical study to determine the macro and internal factors affecting the solvency of commercial banks in the Czech Republic. When collecting and analyzing the data of the above banks in the period from 2009 to 2011, the author has shown that interbank interest rates have a positive correlation with the solvency of commercial banks. However, the authors, Eissa A. Al-Homaidi et al. 2019, when conducting research on the data of 37 commercial banks listed in India between 2008 and 2017, came up with the opposite conclusion. When considering macroeconomic factors, the study suggests that interest rates have a negative relationship and have a significant impact on the solvency of commercial banks. Some domestic studies, such as Truong Quang Thong et al. 2013, Dang Thi Quynh Anh and Tran Le Mai Anh (2022), did not find a correlation between interest rates and the solvency of enterprises.

## **2.3. Research gap**

The solvency of an enterprise is the financial capacity with which the enterprise can make payments at the time the obligation arises, a factor that is of great interest to managers and investors. Because of a good assessment of the solvency, it is possible to make a management policy or an investment plan suitable for each stage of the business in order to achieve the ultimate goal of maximizing the company's profits. businesses. There are many measures of the solvency of a business, such as short-term solvency, quick solvency, and instant solvency. Besides, there are indicators of long-term solvency. Solvency is influenced by both internal factors of the business and external factors of the economy, which are divided into micro and macro factors. Micro Factors include profitability ratio, debt ratio, assets, business size, and some other factors. Macro factors include inflation rate, growth rate, interest rate, and other factors. Each factor has a distinct impact on solvency.

### 3. RESEARCH METHOD

#### 3.1. Data

The authors have collected data of 420 enterprises listed on HOSE at the end of 2021. The study focuses mainly on factors affecting the solvency of listed companies in Vietnam. South in the period 2010-2021. Because the group of businesses in the Finance - Banking industry has certain differences with other industries, the authors remove from the sample the enterprises belonging to these two industry groups. The remaining data is 305, for 11 years, the total number of observations is 3014. Enterprise data is primary data, collected from fully audited annual financial statements as well as aggregated from non-publicly published figures on the Fiinpro platform. Table 1 displays the definition of each variable.

#### 3.2. Method

##### Linear regression

Linear Regression is a basic and most popular algorithm of Supervised Learning, where the forecast output is continuous. The authors based on multivariable linear regression model (Şirin Özlem & Omer Faruk Tan – 2022), has the following general formula:

$$Y = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \dots + \alpha_k X_k + e \quad (1)$$

Y is the dependent variable,  $X_1, X_2, \dots, X_k$  is independent variable,  $\alpha_0$  is a constant,  $\alpha_1, \alpha_2, \dots, \alpha_k$  is the coefficient angle of independent variable, e is the error term of the model.

**Table 1. Definition of variables and dterminants of solvency**

Variables	Formula	Studies
Outcomes		
Cash_ratio	$\frac{\text{Cash and cash equivalents}}{\text{Current Liabilities}}$	Nguyen Thi Xuan hong (2019), Tran Manh Dung & Nguyen Nam Tai (2018)
Quick_ratio	$\frac{\text{Short – term assets – Inventories}}{\text{Current Liabilities}}$	
Current_ratio	$\frac{\text{Short – term assets}}{\text{Current Liabilities}}$	Nguyen Thi Xuan hong (2019), Tran Manh Dung & Nguyen Nam Tai (2018), Dang Thu Hang (2020), Truong Thanh Hang et al. 2020, Tran Van Hai (2021), Anirbid Sircar et al. 2021
DE	$\frac{\text{Liabilities}}{\text{Equity}}$	The authors rely on the characteristics of listed companies to include variables in the model
TD_TA	$\frac{\text{Liabilities}}{\text{Total assets}}$	
Features		
Size	$\text{Log}(\text{Total assets})$	Opler et al. 1999, Dang Thi Nhu Quynh & Tran Le Mai Anh (2022)
ROA	$\frac{\text{Net income}}{\text{Average total assets}}$	Bruinshoofd và Kool (2004), Waqas Bin Khidmat Mobeen Ur Rehman (2014), Dang Thu Hang (2020)
Assets_structure	$\frac{\text{Short – term assets}}{\text{Total assets}}$	Opler et al. 1999, Truong Thanh Hang et al. 2020

Sales_growth	$\frac{Net\ Revenue_t - Net\ Revenue_{t-1}}{Net\ Revenue_{t-1}}$	The authors rely on the characteristics of listed companies to include variables in the model
Assets_growth	$\frac{Total\ assets_{31/12} - Total\ assets_{1/1}}{Total\ assets_{1/1}}$	
Return_growth	$\frac{Net\ income_t - Net\ income_{t-1}}{Net\ income}$	
Tangi	$\frac{Fixed\ assets}{Total\ assets}$	
Cash_assets	$\frac{Cash\ and\ cash\ equivalents}{Total\ assets}$	
GDP	Gross Domestic Product	Tran Manh Dung & Nguyen Nam Tai (2018), Eissa A. Al-Homaidi et al. 2019, Dang Thu Hang (2020), Tran Van Hai (2021); Faruque Ahamed (2021)
CPI	Inflation	
Industry	Business sector - level 1 sub-sector according to HOSE's sub-sector standards	The authors rely on the characteristics of listed companies to include variables in the model

Source: The research team collected

### K-nearest Neighbor (KNN)

K-nearest neighbor (or KNN) is the most basic supervised learning technique in Machine learning. This algorithm solves classification and prediction problems. Here it is considered as one of the top 10 algorithms in data mining because of its efficiency and simplicity simple (Wu et al. 2008), can handle both regression and classification problems. KNN algorithm starts by determining the distance between each value observed data and new data values with unknown target. Distance metric is Euclidean or Manhattan distance function (Zhang 2016), where the Euclidean distance is The simplest and most commonly used. In n-dimensional space, the distance Euclidean between two points  $p(p_1, \dots, p_n)$  and  $q(q_1, \dots, q_n)$  is calculated by the formula:

$$d(p, q) = \sqrt{(p_1 - q_1)^2 + \dots + (p_n - q_n)^2} \tag{2}$$

In addition, the Manhattan distance is calculated based on the absolute difference between points, with the formula:

$$d(p, q) = \sum_{i=1}^n |p_i - q_i| \tag{3}$$

### Decision Tree

Decision Tree is a supervised learning algorithm, applied to judge physical regression and classification problems. Simply, it has the form of a tree with branch represents a feature. This method cuts the data set into parts smaller while growing an associated decision tree. For this technique, it is necessary to clearly define the important terms: Entropy, Information Gain, Gain Ratio and Gini Coefficient. In which, Entropy is a theoretical measure information measuring impurity or uncertainty in a group of (Şirin Özlem & Omer Faruk Tan – 2022). It determines how a decision tree chooses to split the data, is represented by the following formula:



$$H(p) = H(p_1 \dots p_n) = - \sum_{i=1}^n p_i * \log_2 p_i \quad (4)$$

so that the entropy function has the minimum value.

Meanwhile, Information gain (IG) is a metric describing the decrease (improvement) in entropy in X after dividing the dataset on feature (variable) Y. It is calculated as follows:

$$IG(X; Y) = H(X) - H(X|Y) \quad (5)$$

To construct a decision tree, we must perform a search for all valid attributes Information highest gain.

### Random Forest

Random Forest is a commonly used technique for forecasting purposes ability to perform both regression and classification problems. This algorithm works by building multiple decision trees when working with training datasets (Liaw et al.2002; Kumar et al.2006), each tree will perform classification or regression tasks and its own results. The final output is the most voted predictor value through voting rather than relying solely on the conclusions of individual trees, purpose in order to reduce errors in the forecasting model (Mehtar Vijha et al. 2020). This is considered a strong and reliable method. as the number of trees increases, accuracy will be improved. An essential hyperparameter in this algorithm is the number estimated number, representing the number of trees in the forest. Grid Search Cross Validation is often applied to find the number of best estimates. Therefore, this technique has advantages more points than Decision Tree and less problem of overfitting.

### 3.3. Statistical measurements

#### Coefficient of determination

R squared shows how well the model fits the data. Some studies have shown that, with R squared > 50%, a model is considered appropriate. In particular, the higher the R2 value, the stronger the relationship between the independent variable and the dependent variable. That is why R squared is also known as the correlated number system.

$$R^2 = \frac{MSS}{TSS} = 1 - \frac{ESS}{TSS} = \frac{\sum(f_i - \bar{y})^2}{\sum(y_i - \bar{y})^2} = 1 - \frac{\sum(y_i - f_i)^2}{\sum(y_i - \bar{y})^2} \quad (6)$$

#### Mean absolute error (MAE)

Mean Absolute Error (MAE) measures the average magnitude of errors in a set forecasts without considering their direction. That is the mean value on the sample test of the absolute error between the forecast and the actual observation, where all differences individual has the same weight.

$$MAE = \frac{\sum_{i=1}^n |y_i - x_i|}{n} \quad (7)$$

n is the number of data points,  $x_i$  is the actual value and  $y_i$  is the predicted value.

#### Mean squared error (MSE)

Mean Squared Error (MSE) is the most commonly used metric for regression problems. Basically, perform a mean squared error between the predicted and actual values. MSE is a measure of the quality of an estimator and values as close to zero as possible.

$$MSE = \frac{1}{n} \sum_{i=1}^n (Y_i - \widehat{Y}_i)^2 \tag{8}$$

n is the number of data points,  $y_i$  is the observed value  $\hat{y}_i$  is the predicted value.

In regression analysis, plotting is a more natural way to see the overall trend of the data as a whole. Simply MSE indicates how close the regression line is to a set of points. To minimize the MSE, the model can be more accurate, which means the model is closer to the actual data. An example of linear regression using this method is - the OLS method evaluates the fit of a linear regression model to a two-variable data set, but its limitation is related to the distribution of the data.

#### 4. RESULTS AND DISCUSSION

##### 4.1. Results

The data in the paper are one-year lag data for the independent variable. When running the model, the number of observations of the sample decreasing from 3132 observations to 3014 observations after removing the missing data. The results of the descriptive data of the research are showed in Table 2.

Dependent variables on short-term solvency include cash ratio, quick ratio and current ratio with mean value of 0.374, 1.423 and 2.003 respectively. The current ratio fluctuates in the range of [0.097; 6.094]; quick ratio has the smallest value of 0.054 and maximum value of 5.093. The minimum and maximum value of cash ratio are 0.000 and 1.627 respectively. Dependent variables to predict long-term solvency include debt-to-equity ratio and debt-to-total asset ratio with average values of 1,307 and 0.479, respectively. The values of them fluctuate in [0.126;4.079] and [0.001; 1.294] respectively.

Micro-independent variables, the firm size has an average value of 27,881 and fluctuates in [22,939;32510]. The mean value of ROA is 0.078, its minimum value is negative (-0.625) and its maximum value is 0.743. The average asset structure is 0.574 and fluctuates between [0.000;1,000]. The coefficients of revenue growth, asset growth and profit growth have an average value of 0.105, 0.113 and -0.034 respectively. The fluctuations of the 3 variables are [-2.617; 4.029]; [-1.347; 4.422] and [-6.348; 5.489]. The mean value of the mean fixed asset coefficient variable is 0.281, while the minimum value is 0.000 and the maximum value is 0.970. Finally, the variable cash\_assets has an average value of 0.098 and the minimum and maximum values of 0.000 and 0.491 respectively.

For macro-independent variables such as inflation and GDP growth, the mean values of the variables are 0.054 and 0.060 respectively. Inflation has a minimum value of 0.006 and a maximum value of 0.186, while the maximum and minimum values of GDP growth are 0.029 and 0.071 respectively.

**Table 2. Data description**

Features	Obs	Mean	Median	Std. dev	Min	Max
Cashratio	3014	0.374	0.198	0.433	0.000	1.627
Quickratio	3014	1.423	0.982	1.248	0.054	5.093
Currentratio	3014	2.003	1.478	1.390	0.097	6.094
DE	3014	1.307	0.985	1.074	0.126	4.079
TD_TA	3014	0.479	0.494	0.213	0.001	1.294
Size	3014	27.881	27.689	1.380	22.939	32.510

ROA	3014	0.078	0.058	0.088	-0.625	0.743
Assets_structure	3014	0.574	0.604	0.232	0.000	1.000
Sales_growth	3014	0.105	0.089	0.385	-2.617	4.029
Assets_growth	3014	0.113	0.070	0.275	-1.347	4.422
Return_growth	3014	-0.034	0.057	1.024	-6.348	5.489
Tangi	3014	0.281	0.228	0.220	0.000	0.970
Cash_asset	3014	0.010	0.065	0.106	0.000	0.944
CPI	3014	0.054	0.035	0.045	0.006	0.186
GDP	3014	0.060	0.062	0.012	0.029	0.071

Source: Google Colab

Figure 1 shows the correlation between the variables. It can be seen that the independent variables all have correlation coefficients with the dependent variables all below 0.8. That proves that when running the models, there will be no multicollinearity phenomenon. In addition, most of the correlation between the independent variable and the dependent variable on short-term solvency and long-term solvency is opposite. Variables such as industry, ROA, profit growth, GDP growth and cash\_asset have a positive correlation with short-term solvency and a negative correlation with long-term solvency. Besides, the industry variable has a negative correlation with the quick ratio and the GDP variable has a negative correlation with the cash ratio. The other variables such as size, asset structure, revenue growth, asset growth, fixed asset ratio, and CPI have a negative correlation with current ratio and a positive correlation with long-term debt ratio. In addition, revenue growth, fixed asset ratio, and CPI are negatively correlated with cash ratio.

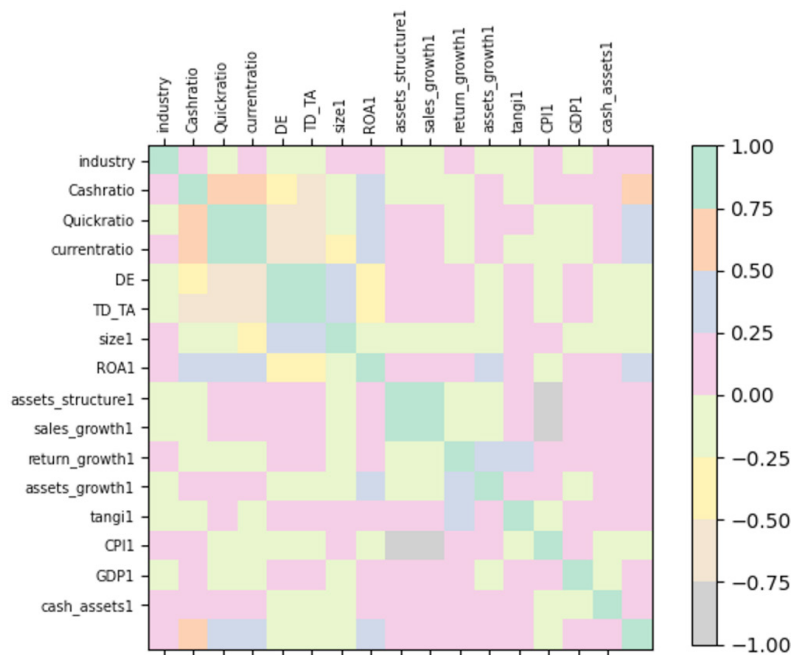


Figure1. Correlation between features and solvency ratios.

Source:Google Colab

In this study, the authors use supervised learning techniques to predict the short-term and long-term solvency of listed companies, respectively. Besides that, estimating the R2\_score, MAE and MSE indexes to evaluate the accuracy of the model. A higher R2\_score would be expected because it reflects how much the variable is likely to explain the model, while a lower MAE and MSE will be better because it shows the difference between the predicted value and the observed value is not great.

Linear Regression is the first technique used as a measure for comparison with other algorithms. The results are presented in Table 3. It can be seen that Cash ratio and TD\_TA are the two models with the best R2 value, about 42.5% and low mean error. However, the other model has bad results due to very high level error.

**Table 3. Performance metrics with Linear Regression**

Linear Regression	Short-term solvency ratios			Long-term solvency ratios	
	Cash ratio	Quick ratio	Current ratio	DE	TD_TA
R square	0.425	0.292	0.282	0.349	0.426
MAE	0.239	0.778	0.853	0.663	0.130
MSE	0.118	1.143	1.408	0.732	0.026

Source: Google Colab

KNN is the second algorithm used. The short-term and long-term solvency models have not improved, even somewhat less effectively. Table 4 shows that MAE and MSE remain high, however R2\_score significant decrease in Cash ratio and other models have no significant change.

Decision Tree is the next algorithm used by the authors and its result is shown at Table 5. This is the technique with the worst predictive results, in which two models, Quick ratio and Current ratio, are not significant due to the inability of variables to explain the model. The R2\_score values of most models are very low, and the MAE and MSE show that the difference between the observed and predicted values is very high.

**Table 4. Performance metrics with KNN**

KNN	Short-term solvency ratios			Long-term solvency ratios	
	Cash ratio	Quick ratio	Current ratio	DE	TD_TA
R square	0.237	0.292	0.304	0.373	0.424
MAE	0.251	0.681	0.742	0.592	0.121
MSE	0.157	1.143	1.364	0.706	0.026

Source: Google Colab

**Table 5. Performance metrics with Decision Tree**

Decision Tree	Short-term solvency ratios			Long-term solvency ratios	
	Cash ratio	Quick ratio	Current ratio	DE	TD_TA
R square	0.018	-0.087	-0.124	0.130	0.238
MAE	0.289	0.849	0.935	0.675	0.139
MSE	0.202	1.753	2.203	0.980	0.035

Source: Google Colab

The last technique used was the Random Forest. Table 6 gives quite good estimation results but has similarities with previous algorithms. In general, the two models Cash ratio and TD\_TA predict solvency effectively.

**Table 6. Performance metrics with Random Forest**

Random Forest	Short-term solvency ratios			Long-term solvency ratios	
	Cash ratio	Quick ratio	Current ratio	DE	TD_TA
R square	0.344	0.224	0.236	0.298	0.353
MAE	0.263	0.809	0.873	0.679	0.139
MSE	0.135	1.251	1.497	0.791	0.030

Source: Google Colab

We split the data set into 8 parts based on industry hierarchy, corresponding to 8 models to predict the solvency of listed companies in the industry. Supervised learning techniques continued to be used, and the authors found that Information Technology industry had the best predictive results. Table 8 shows that most of the solvency models of both industries have a high fit, except for Quick ratio.

**Table 8. Performance metrics of solvency ratios for Information Technology**

	Linear Regression	KNN	Decision Tree	Random Forest
Cash ratio				
R2_score	0.505	0.504	0.404	0.611
MAE	0.285	0.336	0.337	0.289
MSE	0.159	0.159	0.192	0.125
Quick ratio				
R2_score	0.145	0.194	0.409	0.354
MAE	0.539	0.505	0.416	0.488
MSE	0.424	0.400	0.293	0.321
Current ratio				
R2_score	0.546	0.477	0.444	0.533
MAE	0.599	0.662	0.641	0.624
MSE	0.616	0.709	0.753	0.633
DE				
R2_score	0.457	0.367	0.307	0.338
MAE	0.506	0.561	0.588	0.606
MSE	0.484	0.565	0.618	0.591
TD_TA				
R2_score	0.647	0.492	0.443	0.485
MAE	0.104	0.127	0.117	0.128
MSE	0.017	0.024	0.027	0.025

Source:Google Colab

## 4.2. Discussion

Solvency is an important measure to assess the financial capacity of the business, showing the ability to meet debts when they come due. The study uses data of 305 enterprises (except companies in the Banking and Finance sector) listed on HOSE in the period 2010 - 2021, the total number of observations is 3014. The authors use 4 supervised learning techniques: Linear Regression, KNN, Decision Tree and Random Forest to predict short-term and long-term solvency of firms.

When evaluating the accuracy of the predictive model on testing data, we found that besides the regression model, KNN and Random Forest have good predictive ability. In which the model TD\_TA has the highest fit, followed by Cash ratio but the difference in accuracy between the techniques is quite large. The remaining models are not highly effective because the average error is at a very high level, making the reliability of the prediction results unsatisfactory. In general, when building a machine learning model and testing it on testing data, it does not bring the expected results due to the large error, which is shown by the two indicators MAE and MSE while the explanatory power of the model is poor (low R2\_score). Compared with the regression model (Linear Regression), three techniques KNN, Decision Tree and Random Forest have not had a clear improvement, even for some predictive models there is no meaning.

The authors, when retesting the predictive ability of the model on training data, found that the results had a positive trend. It is noteworthy that Decision Tree technique when giving absolute efficiency with R2\_score in all models is 100%, but before working with testing data, this algorithm did not have good results. This shows that Decision Tree is having an overfitting problem, that is, when working on training data that performs well but is less effective on testing data. On the other hand, KNN shows a good ability to operate and work with the model because both bring positive results for the two data sets.

## 0. Conclusion

A lot of significant data may be evaluated and produced through the application of machine learning to the administration of businesses. By accurately accounting for the impacts of several influencing factors, this approach performs an analysis of large-scale and complicated research samples, something that previous methods have not been able to do. Due to the fact that each technique will have a different approach to data analysis and processing, there are still a lot of issues with machine learning accuracy that need to be resolved. According to the outcomes of the research, each algorithm's anticipated value and the actual value diverge by a sizable amount, even after accounting for the influence of macro and micro factors on solvency. The research project is limited in part by the size of the data set and the close relationships between the variables, which render the standard supervised learning techniques ineffective. The authors propose utilizing deep learning techniques (Deep Learning) and Neural networks to resolve this issue because these methods function more intricately and create neural networks to analyze the input vastly and interconnectedly.

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## FACTORS AFFECTING THE SUSTAINABLE DEVELOPMENT OF VIETNAM COMMERCIAL BANKS

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**ABSTRACT:** Sustainable development is emerging as a global trend among commercial banks. In Vietnam, this issue has garnered attention from the government, as well as economic and social management agencies, initiating a promotion process. However, the lack of sustainable development standards in Vietnamese commercial banks poses several challenges to this process. This study aims to examine and analyze the significant factors that influence the sustainable development of commercial banks in Vietnam. The research sample consists of 112 bank officials and employees who possess knowledge of sustainable development issues. They participated in an online questionnaire survey. The authors conducted theoretical research based on domestic and international literature regarding the factors influencing the sustainable development of commercial banks. They employed linear regression analysis to analyze the current situation based on the questionnaire responses. By utilizing online surveys and multiple regression models, the study aims to identify and conclude the factors that influence sustainable development in commercial banks in Vietnam. A total of 112 participants took part in the survey, and the collected data was quantitatively analyzed using SPSS 20.0 software. The research results identified three influencing factors in the sustainable development process of commercial banks in Vietnam: Environmental factors, Social factors, and Governance factors. Therefore, the study proposes recommendations to assist commercial banks in effectively achieving the government's sustainable development goals.

**Keywords:** Affecting Factors; Sustainable Development; Commercial Banks.

### 1. INTRODUCTION

#### 1.1. International studies

##### Assessing Sustainability through Operational Efficiency

In recent years, the concept of “sustainable development” has been extensively discussed in articles and research papers. It is evident that the notion of sustainable development has gained recognition globally. In order to effectively implement sustainable development processes in banks, researchers both internationally and in Vietnam have conducted numerous studies to identify factors that influence the stability, efficiency, and sustainability of commercial banks.

Tom (2012) utilized the CAMEL model, developed by the US Office of the Comptroller of the Currency to monitor the status of credit institutions in the United States, to determine the operational efficiency of commercial banks in Kenya. By analyzing linear regression using tabular data, the author discovered that Capital adequacy, Income, and Liquidity had a negative impact on bank operational efficiency. Consequently, banks should strive to strike an optimal balance in terms of capital adequacy and liquidity ratios. In the same year, Vijayakumar also employed the CAMEL model to assess the operational efficiency of commercial banks in India. Based on the average of the following ratio groups: C - Capital adequacy, A - Asset quality, M - Management capability, E - Earnings capacity, and L - Liquidity capacity, the author ranked the commercial banks. The computed figures demonstrated that commercial banks in India succeeded in maintaining a higher capital adequacy ratio than the prescribed requirement (>9%).

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In contrast to the assessment of the operational efficiency of commercial banks based on the CAMEL model, Michael Adusei (2015) examined the impact of bank size and loan risk on bank stability. This study collected data from rural banks in Ghana from the first quarter of 2009 to the fourth quarter of 2013. The research incorporated diversification, credit risk, liquidity risk, profitability, inflation, and GDP as control variables. The findings revealed that an increase in the scale of rural banks enhances bank stability, and loan risk also positively affects bank stability.

Evaluating the Sustainability of Commercial Banks through Environmental and Social Commitments:

Contrary to previous studies, the research team consisting of Guang-Wen Zheng, Abu Bakkar Siddik, Mohammad Masukujjaman, and Nazneen Fatema (2021) has demonstrated the validity of the hypothesis that the environmental aspect of Green Finance plays a crucial role in enhancing the sustainable operations of banks through investments in environmentally beneficial projects. The study utilized secondary data obtained from the annual reports of the Bangladesh Bank, as well as surveys conducted among employees in 35 out of 47 operational banks. However, it is important to note that the study solely focused on the opinions of bank executives regarding the aspects of Green Finance, which represents only a fraction of the bank's sustainability efforts. Therefore, the resulting findings may not be generalized beyond the scope of the study. Based on a comprehensive review of research conducted worldwide, it is evident that there has been a lack of comprehensive studies analyzing the factors influencing the sustainable development model of the commercial banking system and their direct impact on it.

Assessing the level of sustainable development according to the Global Reporting Initiative (GRI) standards:

The Global Reporting Initiative (GRI) is a widely utilized framework for voluntary reporting on environmental and social activities by businesses and organizations worldwide. GRI offers comprehensive guidance and standards for reporting information regarding an organization's environmental, social, and governance issues. The GRI performance indicators encompass a range of core indicators and supplementary indicators that encompass the three fundamental dimensions of sustainability: economic, environmental, and social indicators. The following are the performance indicators as outlined by GRI:

**Table 1: GRI performance indicators**

Performance indicators	Core indicators	Additional indicators	Total number
Economic	10	3	13
Society	16	19	35
Environment	24	25	49
Total number	50	47	97

*Source: Moneva and collaborators (2006)*

GRI has been widely adopted by banks worldwide to assess their level of sustainable development. Standard Chartered Bank, for instance, has implemented GRI in reporting and evaluating its financial, environmental, and social performance. They have incorporated GRI into their sustainability reports, providing detailed information about the bank's impact on the community and the environment. Similarly, ABN AMRO, a multinational bank headquartered in the Netherlands, has utilized GRI to develop its sustainability strategy and assess its effectiveness in promoting sustainability. They have employed GRI to select appropriate indicators and report in accordance with international standards. Another bank, Santander, a multinational bank based in Spain, has utilized GRI to report on its sustainable activities and approach

to social finance. GRI has played a pivotal role in helping Santander identify key indicators and reporting standards, ensuring transparency, and facilitating comparisons with other banks.

A comprehensive analysis of existing global studies reveals that, thus far, no research project has thoroughly examined all the influencing factors and their direct impact on the sustainable development model of the banking system. Therefore, this research aims to enhance our understanding of the factors that influence the awareness of sustainable development in banking institutions.

## **1.2. Domestic studies**

In Vietnam, sustainable development in commercial banks has also been addressed in several studies as follows:

Nguyen Thanh Phuong (2014) argued that two main factors influence the sustainable development of commercial banks, including internal and external factors. The external factor is the macro environment, which includes elements such as the economy, politics and law, government, culture and society, population, nature, and the microenvironment, which includes factors like existing and potential competitors, customers, and alternative financial markets. The author focused on studying the internal factors: human resources, managerial capabilities, product portfolios, services, and banking technology. However, since the research aimed to explore the requirements and standards of sustainable activities and the development model of the commercial banking system, the article did not delve deep into the impact of the influencing factors on sustainable development.

To analyze the impact of macro factors more clearly, Leng Thi Lan and colleagues (2021) established a model and presented their findings. The study showed that the growth rate of GDP, interest rates, and risk-free interest rates have a greater impact on the market risk of banks. Therefore, the State Bank of Vietnam and relevant government agencies need to control GDP growth and reduce lending and treasury bond interest rates.

Nguyen Hong Son and colleagues (2015) synthesized perspectives and evaluation criteria for sustainable banking development. Through an assessment of the current state of development of the commercial banking system in Vietnam and its restructuring following international practices, the authors proposed solutions for sustainable development of the commercial banking system in Vietnam. However, the study mainly focused on assessing the current state of development and restructuring of the commercial banking system based on criteria for evaluating stability and soundness. It did not extensively evaluate the current state of sustainable development of the commercial banking system in terms of environmental and social aspects in banking operations, following international practices.

In the above studies, the authors identified factors influencing sustainable development, but most of them had a limited scope, focusing on one or a few commercial banks without comprehensive coverage. Furthermore, the studies did not extensively examine the impact of each factor on the sustainable development model of commercial banks.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Theoretical basis**

#### **2.1.1. *Characteristics of sustainable development in commercial banks***

Based on previous research, the authors have identified the characteristics of sustainable development in banks as follows:

(1) Sustainable banks have strong and efficient financial capabilities. They employ medium and long-term strategies to maintain a sufficiently robust financial capacity, enabling them to sustain and recover from risks arising from external impacts or business losses.

(2) Sustainable banks have policies that support and provide financing for companies or projects that are responsible for the environment and society, aiming to foster sustainable economic development. Additionally, sustainable banks implement solutions to monitor, limit, and address adverse impacts on the environment and society.

(3) The activities of sustainable banks bring benefits not only to shareholders but also to customers, regulatory authorities, and employees. The strategies of sustainable banks aim to meet the needs of both the bank and the community while considering short-term and long-term value.

### ***2.1.2. The role of sustainable development in commercial banks***

Firstly, sustainable development enhances the profitability of commercial banks and creates favorable conditions for the overall sustainable development of the economy.

Secondly, it ensures the resilience, safety, survival, and development of commercial banks against environmental impacts.

Thirdly, the sustainable development of commercial banks plays a role not only in the sustainable development of the economy but also in the stability of the environment and society.

Fourthly, from a social perspective, sustainable banks prioritize not only profitability for shareholders but also ensure benefits for customers and the rights of bank employees. Sustainable banks focus on social and political aspects, including employee welfare, issues of equality, human rights, and policies supporting lending to the poor and rural areas to improve the quality of life and achieve social and political sustainability.

### ***2.1.3. Indicators for assessing the sustainable development of commercial banks***

The Global Reporting Initiative (GRI) Sustainable Development Report is the first widely applied global standard for sustainable development reporting. It supports large and small public and private companies in protecting the environment, community development, and economic development by improving governance and stakeholder relationships, enhancing reputation, and building trust. Currently, Vietnamese commercial banks are preparing reports based on the standards provided by the Global Reporting Initiative (GRI) Sustainability Reporting Guidelines. The GRI standard provides a common language for banks and stakeholders to understand the economic, environmental, and social impacts of the banks.

According to GRI (2016), a sustainable development report is defined as “measuring, disclosing, explaining, and being accountable to internal and external stakeholders for an organization’s performance toward sustainable development goals.” The issues related to the 17 Sustainable Development Goals and the National Action Plan for implementing the 2030 Agenda for Sustainable Development have been simplified and integrated into the 2020 Corporate Sustainability Index (CSI) on social responsibility and environmental responsibility (VCCI, 2020). In 2020, the CSI program evaluated companies based on 119 indicators in four areas: Sustainable Development Performance Indicators, Governance Indicators, Environmental Indicators, and Labor-Social Indicators (VCCI, 2020). Therefore, sustainable development indicators include profitability, profitability capacity, import-export turnover, average income of workers, contributions to the budget and society, wastewater ratio, waste collection and recycling, and energy efficiency in production and business processes. Environmental indicators are also emphasized, including compliance with laws, efficient use of natural resources, environmental protection, pollution prevention,

incident response, environmental improvement, and environmental education and communication within companies. Thus, it can be seen that the CSI indicators align with the GRI standards, serving as a basis for listed companies in Vietnam to comply with and fulfill their obligations regarding sustainable development reporting.

Based on the GRI report, it is possible to compare the performance of banks in achieving sustainable development goals. When a bank successfully fulfills these goals and discloses them comprehensively, the market will react positively to the bank. This increases the bank's reputation and long-term profitability.

## **2.2. Research hypothesis**

Sustainability in the environment means that while utilizing natural resources, the quality of the human living environment must be ensured. This includes ensuring the purity of air, water, land, geographic space, and landscapes. The quality of these elements must be consistently valued and evaluated according to national and international standards. We need to efficiently utilize natural resources to improve the environment and enhance the quality of the living environment. According to Associate Professor Dr. Pham Thi Thanh Binh from the Institute of World Economy and Politics (2020), sustainable environmental development includes the following main contents: efficient use of resources, particularly non-renewable resources; development within the carrying capacity of ecosystems; biodiversity protection and ozone layer preservation; greenhouse gas emissions reduction; strict monitoring of sensitive ecosystems; waste reduction, pollution improvement (water, air, soil, food), and environmental improvement and restoration in polluted areas.

Hypothesis 1: The Environmental Factor has a positive impact on the sustainable development of commercial banks.

Long-term and ever-changing issues such as consumer habits, saving habits, religion, ethnicity, etc., are factors that banks need to understand in order to create demand for people to use banking products and services and develop products that align with their habits and needs. According to Tran Thi Hoang Yen (2016): "The social responsibility of a bank is a commitment to effectively address issues of corporate governance, human rights, labor practices, environment, fairness in operations, customers, and communities, based on compliance with national laws, international customs, and ensuring a harmonious balance of interests while contributing to the sustainable socio-economic development of the country." In practice, the social responsibility of banks, in particular, and businesses in general, is a broad concept that can be understood and expressed in various ways based on the perspective of each author. Regarding the responsibility towards stakeholders, Hopkins (2003) points out that Corporate Social Responsibility (CSR) concerns dealing with both internal and external stakeholders of a business in a socially responsible manner. In other words, the broader goal of CSR is to create an increasingly high standard of living while maintaining the profitability of the business for its relevant parties.

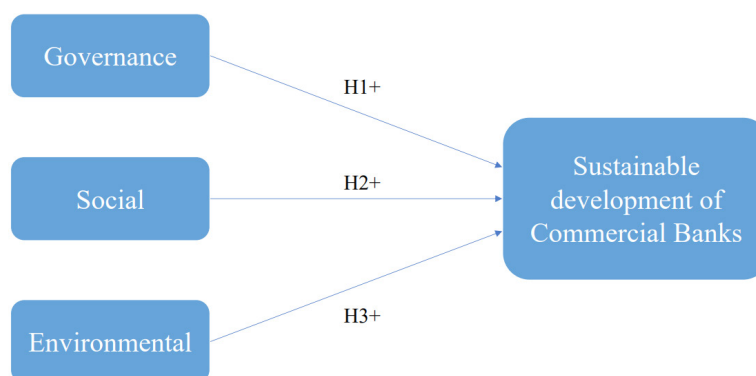
*Hypothesis 2: The Social Factor has a positive impact on the sustainable development of commercial banks.*

Governance in banking refers to a system of arrangements, policies, and regulations that guide, operate, and control the bank. Governance focuses on the structures and processes of the company to ensure fairness, transparency, and accountability. Therefore, governance is always an important aspect of effective bank management and serving the interests of shareholders. Sustainable development of banks in terms of governance includes the following aspects: the rate of total asset growth of commercial banks, which reflects the scale, structure, and quality of assets and indicates the bank's level of development; the rate of loan growth, which is a criterion that clearly reflects the bank's management capability; the rate of

net income growth, which indicates the business efficiency of commercial banks through criteria such as net interest income, income from service activities, income from foreign exchange trading, income from securities trading, etc.

*Hypothesis 3: The Governance Factor has a positive impact on the sustainable development of commercial banks.*

**Figure 1. Proposed research model**



### 3. RESEARCH METHOD

After synthesizing theories, models, and inheriting from domestic and international research studies, the research team has filtered and selected appropriate factors to construct a research model (Figure 1) on the influential factors of sustainable development consciousness among SMEs in Vietnam.

The research team chose to conduct the investigation through a questionnaire distributed to employees and staff members of banks throughout Hanoi city. The data collection for this study took place from January 2022 to March 2022, resulting in a total of 115 responses. However, upon further examination, three responses were found to be erroneous and inconsistent, leaving a final sample of 112 valid responses for the research. The sample size met the required standards of Bollen (1998) and Hair et al. (1998), which stipulate that it should be at least five times the number of observed variables (minimum of 75).

To measure the sustainable development consciousness of SMEs, the observed variables were assessed using a Likert scale with five response options: (1) Strongly Disagree; (2) Disagree; (3) Neutral; (4) Agree; (5) Strongly Agree. All valid samples were processed using SPSS software to perform the steps of reliability analysis, correlation analysis, factor analysis, regression analysis, and hypothesis testing based on the constructed questionnaire. The questionnaire consisted of three independent variables (Management, Environment, and Society).

### 4. RESULTS AND DISCUSSION

#### 4.1. Results

##### 4.1.1. Survey sample characteristics.

Through the survey, the author collected 115 responses, out of which 112 valid responses (accounting for 97.39%) were used as research data.

**Table 2. Descriptive statistics of the sample by individual characteristics**

Personal Characteristics	Detail	Quantity	Percent (%)
Gender	Male	48	43%
	Female	64	57%
Age	20 - under 40 year olds	46	41%
	40 - under 60 year olds	39	35%
	Above 60 year olds	27	24%
Academic qualification	Bachelor	75	67%
	Master	27	24%
	Doctorate	10	9%
Job position	Specialist	81	72%
	Manager	31	28%
Experience duration	Under 5 years	12	11%
	5 - under 10 years	30	27%
	10 - under 20 years	45	40%
	Above 20 years	25	22%

**4.1.2. Reliability testing of the measurement scale.**

The results in Table X indicate that all variables have Cronbach’s alpha coefficients  $> 0.7$ , and the variable-total correlations are  $> 0.3$ , demonstrating that the variables meet the requirements for reliability and can be used for further exploratory factor analysis (EFA).

**Table 3. Reliability testing of the measurement scale**

Observed variable	Number of observed variable	Cronbach’s Alpha	Minimum total variable correlation coefficient
Governance (GOV)	4	0,757	0,585
Environment (ENV)	5	0,858	0,439
Social (SOC)	6	0,837	0,484

**4.1.3. Exploratory factor analysis:**

The EFA analysis results for 15 independent observed variables represent 3 independent factors with a Kaiser-Meyer-Olkin (KMO) coefficient of 0.771 and a significance level (Sig. = .000) of Bartlett’s test at 5%. This confirms that the data used in this study is suitable. The total variance extracted coefficient is  $61.056\% > 50\%$ , and all factors have Eigenvalues  $> 1$ , indicating that the 3 factors used in the model explain 61.056% of the data variation.

The factor analysis of the dependent variable on the sustainable development of the organizations achieves a score of 0.683 and a significance level (Sig. = .000) of Bartlett’s test at 5%, indicating that these variables are correlated with each other and entirely appropriate for factor analysis. The total variance extracted coefficient is 81.226%, and the Eigenvalue index reaches 2.208, indicating that the 3 observed variables of the dependent variable have formed 1 factor with a total variance extracted of 81.226%.

**Table 4. Results of Exploratory Factor Analysis (EFA)**

Factor	KMO measure	Sig	Total extracted variance
1. Independent variables	.771	0.000	61.056
2. Dependent variables	.738	0.000	81.226

**Table 5. Results of Exploratory Factor Analysis (EFA)**

Biến quan sát	Factor		
	1	2	3
SOC4	.875		
SOC3	.802		
SOC2	.760		
SOC1	.748		
SOC6	.616		
SOC5	.514		
ENV2		.805	
ENV5		.825	
ENV4		.806	
ENV3		.766	
ENV1		.728	
GOV4			.856
GOV2			.745
GOV3			.708
GOV1			.653

**4.1.4. Correlation coefficient matrix**

To examine the correlation between the independent variables GOV, SOC, ENV, and the dependent variable BV, we employed Pearson's correlation test in a scientific research style. The analysis results revealed that all Sig. values were less than 0.05, indicating a linear relationship between the dependent variable and the independent variables.

**Table 6. Analysis of the correlation between factors**

Correlations					
		BV	GOV	SOC	ENV
BV	Pearson Correlation	1	.637**	.476**	.302*
	Sig. (2-tailed)	.000	.000	.000	.002
	N	112	112	112	112
GOV	Pearson Correlation	.637**	1	.593**	.655*
	Sig. (2-tailed)	.000		.000	.000
	N	112	112	112	112
SOC	Pearson Correlation	.476**	.593**	1	.393**
	Sig. (2-tailed)	.000	.000		.001
	N	112	112	112	112
ENV	Pearson Correlation	.302*	.655*	.393**	1
	Sig. (2-tailed)	.002	.000	.000	
	N	112	112	112	112

The adjusted coefficient of determination ( $R^2$ ) is 54.3%, which is considered appropriate as it exceeds the threshold of 50%. Additionally, the Durbin-Watson (DW) statistic of 2.088 falls within the

range of [1, 3], indicating the absence of first-order autocorrelation among the error terms, suggesting good data integrity.

The regression results also reveal that 3 out of 6 variables exhibit statistically significant relationships at the 5% level (Sig.  $\leq 0.05$ ), indicating that the theoretical model is well-aligned with the research data. Furthermore, the variance inflation factor (VIF) for all variables is  $< 2$ , suggesting no issues of multicollinearity in the model.

Regression model:  $BV = 0.940 + 0.402GOV + 0.223SOC + 0.098ENV$

In exploring violations of linear regression assumptions, the Scatterplot (Figure 3) illustrates that the standardized residuals are concentrated around the zero axis, indicating that the assumption of the linear relationship is not violated.

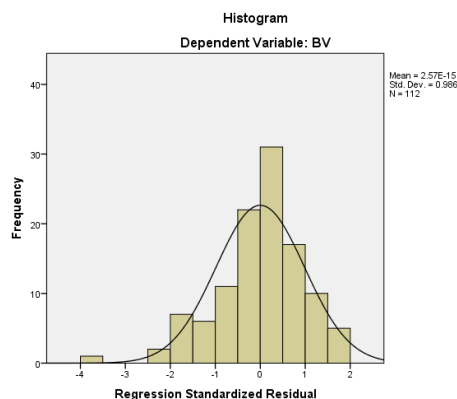
The Histogram (Figure 2) displays a bell-shaped curve, which aligns with the graph’s form of a normal distribution. The standard deviation of 0.986 is close to 1, suggesting that the residual distribution approximates normality and is not violated.

The P-P Plot (Figure 4) represents the observed data points closely clustered around the diagonal line of expected values, indicating that the residual data follows a normal distribution

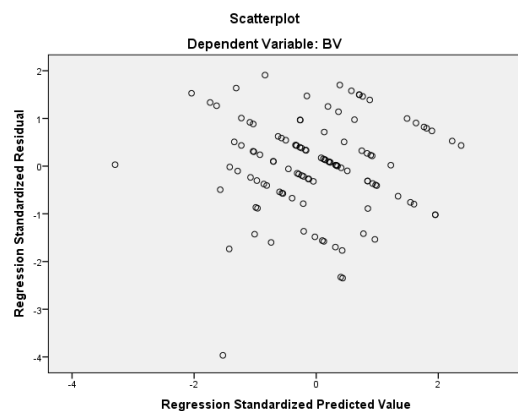
**Table 7. Regression model results**

Model	B	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		Std. Error	Beta				Tolerance	VIF
1	(Constant)	.940	.460		2.043	.043		
	GOV	.452	.100	.402	4.546	.000	.833	1.200
	SOC	.229	.091	.223	2.523	.013	.834	1.199
	ENV	.081	.067	.098	1.197	.000	.979	1.022

Adjusted R = 54,3%  
 Durbin – Watson = 2,088  
 Sig. of ANOVA test = .000

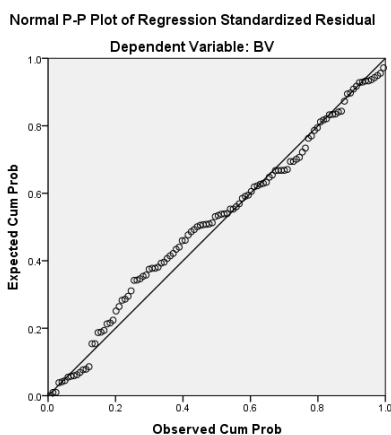


**Figure 2. Histogram chart**



**Figure 3. Scatterlot**





**Figure 4. P-Plot**

## 4.2. Discussion

### 4.2.1. Discussion

After the analysis, the research results show that 3 factors are used to include in the model including “Governance”, “Society” and “Environment” all have significant impact on the dependent variable “sustainable development consciousness of commercial banks”. The Governance factor is considered to have the strongest impact on the sustainable development of the Bank, followed by the Environmental factor with the second strongest impact after the Governance factor, and finally the social factor.

According to the research team, this result is quite accurate and appropriate compared to the present time, in the context that Vietnamese commercial banks are increasingly interested in sustainable banking development. According to the ESG model, activities that have a positive impact on society are a part of affecting the sustainable development of Commercial Banks. income is linked to the bank’s business results, salary is paid according to requirements and work efficiency, there are reward regimes to encourage employees to stick with the bank. Commercial banks have training policies to improve the quality of human resources and promotion policies to motivate employees to promote their own capabilities.

### 4.2.2. Solutions and Recommendations

#### For Commercial Banks

##### About Environment and Society

Firstly, Commercial Banks need to establish and improve their ESMS (Environment and Social Risk Management System) based on the environmental and social risk management policy framework established by the State Bank. Establishing an ESMS to assess, manage environment and social in the customer management process will enable banks to facilitate the approval of loan projects.

Secondly, Commercial Banks need to focus on training and developing the quality of human resources towards sustainable development. Specifically, this includes presenting a positive and professional image to candidates at the early stage of recruitment; implementing specific career development paths for officers and staff; providing appropriate incentives for each job position.

##### About the Governance

Firstly, Commercial Banks need to effectively manage and tightly control non-performing loans to improve the quality of assets and financial capacity. This includes regularly assessing and classifying

the debt recovery ability of customers, undertaking debt restructuring to support struggling businesses, especially in the aftermath of the Covid-19 pandemic.

Secondly, Commercial Banks need to enhance their management capacity and operate according to international standards. Quality management is a crucial factor for sustainable development and the banking governance model must ensure independence in terms of authority and responsibility.

Thirdly, Commercial Banks need to develop and leverage capital sources, increasing equity capital through various measures, including issuing bonds, medium and long-term deposit certificates; studying capital costs in urban areas to formulate appreciate mobilization policies; utilizing capital sources from financial institutions as they provide long-term funding with low fundraising costs.

#### **For regulatory agencies**

To achieve sustainable development goals in Vietnam Commercial Banks, regulatory agencies such as the government and the State Bank of Vietnam play a crucial role in issuing and overseeing regulations. Specifically:

Firstly, the government needs to establish a national legal framework for sustainable development and enforce it mandatorily for banks, businesses, and other organizations. This framework should align with national sustainability policies and require businesses to adhere to sustainable practices.

Secondly, the State Bank of Vietnam should introduce incentive mechanisms and tax advantages to promote green and sustainable financial activities in commercial banks. This can include providing preferential interest rates for loans or supporting investment capital for projects that have positive impacts on the environment and society.

Thirdly, the State Bank of Vietnam needs to invest in training and raising awareness about sustainable development within the banking industry. This can be achieved through developing training programs, organizing seminars and discussions, and collaborating with educational institutions to create research programs and address issues related to sustainable development.

Fourthly, the State Bank of Vietnam should implement programs to promote and disseminate information about sustainable development in commercial banks. The content should include reports, guidelines, and educational materials aimed at explaining fundamental concepts, benefits, and standards related to sustainable development. Additionally, the State Bank of Vietnam can collaborate with environmental and social organizations, institutions, and relevant stakeholders to enhance promotion through campaigns, events, and community activities. This can also involve partnerships with universities, research institutes, and participation in international forums and discussions.

#### **For customers**

Firstly, customers should research and choose sustainable commercial banks by considering their criteria and regulations regarding the environment, society, and governance. They should explore the sustainable financial products and services offered by banks.

Secondly, customers should use sustainable financial products and services provided by commercial banks, including green loans, social savings and investments, green investment funds, and green insurance.

Thirdly, customers can request and provide feedback to commercial banks regarding the promotion of sustainable development. They can send feedback, suggestions, and proposals to banks regarding policies, standards, and products related to sustainable development. Customer participation and proactivity can exert pressure on banks to enhance awareness and implement positive changes.

## 5. CONCLUSION

The research study evaluated the factors influencing the sustainable development of commercial banks, including Environment - Society - Governance. The study surveyed management executives from several Commercial Banks, and the results showed that the surveyed banks are all concerned and actively implementing sustainable banking development. From this, it can be seen that the majority of Commercial Banks in Vietnam have been and are pursuing sustainable development goals. However, there are still many barriers to overcome in the implementation process. These barriers need to be addressed promptly to successfully execute a safe, effective, and sustainable development strategy for the commercial banking system, such as: enhancing the legal framework for sustainable development, improving the quality of human resources and capital capacity, and refining the environmental and social risk management system. Based on the analysis of the current situation of the influencing factors and their impact on the sustainable development process of Vietnamese Commercial Banks, the research project has proposed sustainable solutions for the sustainable development of Vietnam Commercial Banks in line with international integration trends.

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## THE IMPACT OF THE POLICY RATE ON VIETNAMESE COMMERCIAL BANKS' PROFITABILITY

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**ABSTRACT:** *This study uses a number of regression models and data from several registered Vietnamese commercial banks to examine the impact of the policy rate on the profitability of commercial banks in Vietnam over the course of ten years, from 2013 to 2022. Differently from most of the previous related studies that concentrated on advanced economies, this study offers empirical evidence on the relationship between the policy rate and commercial bank profitability in Vietnam. The refinancing rate is used to measure the policy rate, while the Return over Equity ratio serves as an index for bank profitability. The estimations reveal a significant negative impact of the refinancing rate on the Return over Equity ratio of Vietnamese commercial banks, although this negative effect was found to be increased over time. Moreover, the results show that the Return over Equity ratio of Vietnamese commercial banks is significantly affected by it lags, from the first to fourth lags.*

**Keywords:** *bank profitability, policy rate, monetary policy*

### 1. INTRODUCTION

The COVID-19 pandemic caused a 3.1% reduction in the global economy in 2020, with advanced economies experiencing a 4.5% decline and emerging and developing nations experiencing a 2.1% decline. Many countries aggressively launched a loosening monetary policy together with multiple stimulus packages to address the challenge of the pandemic. As a result, aggregate demand suddenly increased in 2021. In the US and other developed economies, this has led to excessive inflation along with supply chain disruptions. Inflation was further fueled by the energy crisis as Russia, one of the largest fossil fuel exporters, was isolated from Western markets.

In 2022, inflation issues continued to intensify in several countries. To control and bring inflation close to the target inflation rate, the US Federal Reserve has increased the FED fund rate six times since March 2022, specifically the federal funds rate has been raised to 3.75% - 4%, the highest level since January 2008. Many central banks around the world have applied tightening monetary policies and raised their policy rates. By the end of the third quarter of 2022, nearly 90 economies around the world have conducted 257 interest rate hikes. In response to interest rate adjustments made by more than 90 central banks around the world, on October 24, 2022, the State Bank of Vietnam also issued Decision No. 1809/QĐ-NHNN to raise the policy rate by 1% to control inflation, stabilize the macro-economy, and simultaneously securitize crucial economic indicators.

It is clear that the State Bank of Vietnam's interest rate policy is essential for keeping inflation under control and stabilizing the macroeconomy. This policy has an impact on how commercial banks operate, which has an impact on their profitability. A number of studies have shown how the policy rate affects the profitability of commercial banks (Borio et al, 2017; Gambarcota, 2009, etc). However, these studies were frequently carried out in developed and advanced economies. In developing nations, particularly Vietnam, the

literature and empirical evidence are found to be rather inefficient. Therefore, the authors decided to conduct this research to determine the impact of the policy rate on the profitability of commercial banks in Vietnam, which contributes to both the literature and the monetary policy conduction of the State Bank of Vietnam.

This study includes five sections. Apart from the first section of introduction, literature review will be presented in section 2. Section 3 describes data and methodology which are applied in this study. Section 4 shows results of regression models and related discussion, while some conclusions and policy implications will be provided in section 5.

## 2. LITERATURE REVIEW

Monetary policy has been used by central banks around the world as a mean to regulate a country's economy and achieve its macroeconomic goals. The policy rate (also known as the central bank rate) is a key monetary policy instrument set by the central banks as a basis for all interest rates in an economy. Due to the crucial role of the policy rate and its impact on the financial system, a number of studies on the topic have been conducted.

In the context of advanced economies, the body of literature often focuses on how banks react in a condition that interest rates are purposefully kept low for an extended period. Using data from 109 international banks based in developed economies for the 1995-2012 period, Borio et al (2017) examined the impact of changes in the level of short-term rate and the slope of the yield curve on the different components of a bank's income statement. The study suggests that the positive impact of the interest rate structure on net interest income dominates the negative one on loan loss provisions and on non-interest income, and that an extended period of unusually low-interest-rate environment erodes bank profitability. Elaborating on bank activities in a low-interest-rate environment, a study by Brei et al (2020), in which Borio was also a contributor, found that low-interest rates induce banks to shift their activities from interest-generating to fee-related and trading activities. Based on this shift in the main income source of banks, an inference of a corresponding change in bank profitability can be made, which needs further study.

Gambacorta (2009) found a trend of increased risk-taking in banks when interest rates are low for an extended period. In particular, an average bank's probability of default increases by 3.3% after 10 consecutive quarters of interest rates being maintained below the benchmark. This growth in bank risks implies a decrease in the bank's profitability and stability. This finding is further supported by another study also by Gambacorta et al (2014) which was conducted on 643 listed banks in the European Union and the United States.

On the other hand, Hancock (1985) with data from the Federal Reserve System showed a positive relationship between raising interest rates and bank performance. This is due to the income generated by higher loan interest rates being higher than the cost generated by higher deposit rates.

From the aforementioned research, it can be seen that an expanded time of low-interest-rate environment tends to have a damaging effect on bank income; on the other hand, a rising interest rate in some cases will support the improvement in bank profitability. However, there are also a number of studies that have established a negative relationship between a higher policy rate and the performance of commercial banks. Gerlach et al (2018) studied how banks' funding costs will change when interest rates are raised. The study implies that a 1% increase in the Federal Funds rate would increase overall deposit funding costs by about \$40 billion, which is roughly equal to 25% of aggregate annual net income for commercial banks and savings institutions. This means that banks' interest income and subsequently bank profitability will be damaged by an increase in the FED rate.

Altavilla et al (2017) examined the impact of monetary policy on banks' profitability in the context of a low-interest-rate environment with ROA as the indicator for bank profitability. The study focused on the period from 2000 to 2016 with quarterly data collected from banks in Europe and found that a loose monetary easing policy is relatively more beneficial for banking activities. Specifically, low interest rates will promote economic activities, and have a positive impact on bank profits. However, keeping interest rates low for an extended period also harms the profitability of banks.

Lehmann and Manz (2006) concluded a significant impact of macroeconomic factors, which include interest rates, on the profitability of Swiss banks. In particular, rising interest rates, among other changes in the macroeconomic environment including financial crisis and the crash of the stock market, will lead to a remarkable loss in the Swiss banking system.

Kumar et al (2020) studied the relationship between monetary policy and bank profitability in New Zealand using a generalized method of moments model on data for 19 commercial banks in New Zealand from 2006 to 2018. The result shows that short-term rates have a positive impact on bank profitability, while long-term rates affect bank performance negatively. Paula (2020) also found that a loose monetary policy has a negative impact on net profit margin, thereby affecting bank profitability.

In the context of developing economies, there are different conclusions in the body of literature. Examining the effect of monetary policy on bank profitability in India, Rao et al (2006) included the bank rate of RBI (Reserve Bank of India) as one of the independent variables in their regression model. The study was conducted on data from both the public and private banking sectors. The result showed that the central bank rate contributes negatively to both sectors' profitability, with the public banks being subjected to more significant influence. On the other hand, Uchendu (1995) used data from 44 commercial banks and data provided by the Central Bank of Nigeria and concluded a positive influence of a rising interest rate on bank profitability.

Mbabazize et al (2020) used data covering nine years from 2010 to 2018 from all registered commercial banks at the time in Uganda and found a positive relationship between the policy rates and bank profitability.

The impact of the policy rate on bank profitability has also been studied from an unconventional banking perspective. Minny and Görmüş (2017) used a FMOLS model with quarterly data from three Islamic banks in Turkey (Kuveyt Turk, Al Baraka Turk, and Turkiye Finance) for the 2008-2016 period to investigate the impact of interest rates on Islamic banks' profitability. The empirical study suggests that a rising interest rate induces a slight increase in an Islamic bank's profitability. Noreen et al (2018) studied the relationship between changes in interest rates and the profitability of four Pakistani banks and found a direct and positive influence of interest rates on bank performance.

As same as in other countries, in Vietnam, the policy rate and its impact are often examined as a part of the monetary policy. To investigate how monetary policy affects bank profitability, Nguyen et al (2016) used annual data for the period 2007-2014 from 20 commercial banks operating in Vietnam. The study then constructed a regression model in which the bank's profit was implemented as the dependent variable, together with three independent variables representing different proxies of the monetary policy, including the money base, the discount rate, and the required reserve ratio. Aside from that, they also included some internal and external determinants of bank performance as other independent variables including the bank's credit growth, loan-to-deposit ratio, liquidity ratio, and the economic growth of the country. The study concludes a significant negative relationship between the discount rate and banking profit.



Do (2017) evaluated how interest rates and yield curves affect the profitability of Vietnamese commercial banks. The study used a research sample of 24 commercial banks in Vietnam with the annual data from 2006 to 2016. The research results show a nonlinear relationship between the interest rate structure and bank income. More specifically, how short-term interest rates and the slope of the yield curve affect the ratio of banks' ROA and NIM can be illustrated by an inverted U-shaped parabola. This means that in the short term, an increase in interest rates helps increase bank profitability but in the long term, the impact is reversed and becomes damaging. Meanwhile, the relationship between interest rates and NIM is U-shaped, which means that at first, an increase in interest rates reduces non-interest income, then at a certain point, as interest rates keep rising, non-interest income increases. In another study, Nguyen (2017) with data for the 2006-2015 period in Vietnam found that the impact policy rates have on banks' interest rate spread is inconclusive, which is different from previous studies.

According to the literature, bank profitability can be significantly impacted by changes in policy interest rates. However, there are some differences in the findings of the earlier studies, and the specific impacts depend on various factors. Therefore, more research is required.

### 3. DATA AND METHODOLOGY

#### 3.1. Data

Data were collected from quarterly reports of 11 Vietnamese commercial banks over the period from the first quarter of 2013 to the fourth quarter of 2022. The total number of observations is 440. Bank profitability is indexed by return on equity (ROE) and the policy rate is indexed by the refinance rate issued by the State Bank of Vietnam (PR). A number of bank-specific independent variables are also added to the model, including non-performing loans ratio (NPL) which indexes the credit quality of the bank, loans to deposit ratio (LDR) which represents the liquidity availability of the bank, and the leverage ratio (LEV) which measures the insolvency risk of the bank.

**Table 1. Data Sources and Measurement**

Variables	Acronym	Source	Measurement	A Priori Expectation
Bank Profitability	ROE	Reports of banks	Profit after taxes over equity	
Policy Rate	PR	State Bank of Vietnam	Refinance rate	-
Non-performing loans ratio	NPL	Reports of banks	Non-performing loans over total loans	-
Loan-to-deposit ratio	LDR	Reports of banks	Total loans over total deposit	+
Leverage ratio	LEV	Reports of banks	Total liabilities over total	+

*Source: Compiled by the authors*

#### 3.2. Methodology

The paper investigates the relationship between the policy rate and bank profitability. Panel data set is used in our study. The fixed-effect model was chosen over the random-effect model since bank characteristics can vary widely from one bank to another. Moreover, as other important bank-specific variables may be omitted besides the already selected ones, the dummy variables generated by the fixed-effect model can be useful and help to mitigate this difficulty. A robust standard error was used in our regression process to minimize some common errors that are frequently found in a panel data set, especially heteroskedasticity.

#### 3.3. Model Specification

Based on several previous studies, i.e. Nguyen (2016), Rao et al (2016), the authors have built and proposed a baseline research model as below:

$$ROE_t = \beta_0 + \beta_1 PR_t + \beta_2 NPL_t + \beta_3 LDR_t + \beta_4 LEV_t + e_t \tag{1}$$

From the baseline model (model 1),  $ROE_t$  refers to the return over equity of a certain bank at time  $t$ .  $PR_t$  represents the refinance rate at time  $t$ .  $NPL_t$ ,  $LDR_t$ ,  $LEV_t$  respectively refer to the non-performing loans ratio, loan-to-deposit, and ratio leverage ratio at time  $t$ .  $\beta_0$  is the intercept,  $\beta_1$  to  $\beta_4$  are coefficients of the independent variables.  $e_t$  is the error term.

The above model  $e_t$  can be used to determine whether the relationship between the policy rate and bank profitability is a positive or negative one using the coefficient of  $PR_t$  ( $\beta_1$  from the baseline model). However, the baseline model is unable to clearly specify the intensity at which the policy rate affects bank profitability. Therefore, to address this challenge, we set up a second model:

$$ROE_t = \beta_0 + \beta_1 PR_t + \beta_2 PR_t^2 + \beta_3 NPL_t + \beta_4 LDR_t + \beta_5 LEV_t + e_t \tag{2}$$

In model 2, all variables are as earlier defined, with the addition of the variable  $PR_t^2$ . This variable refers to the square of the policy rate at time  $t$ . From the derivative of equation 2, we can determine whether the influence of the policy rate on bank profitability is strong or weak using the coefficient of  $PR_t^2$  ( $\beta_2$  from Model 2). A negative  $\beta_2$  implies that the influence of policy rate will weaken and diminish over time, while a positive  $\beta_2$  hints at the opposite.

One more notable aspect is that bank profitability tends to be affected by its profitability in previous periods. This has been mentioned in the literature, i.e. Mbabazize et al (2020), Altavilla et al (2017), etc. To further examine this, the study adapted the two previous models by adding lagged dependent variables of different levels to the new models:

$$ROE_t = \beta_0 + \beta_1 PR_t + \beta_2 PR_t^2 + \beta_3 NPL_t + \beta_4 LDR_t + \beta_5 LEV_t + \beta_6 ROE_{t-1} + \beta_7 ROE_{t-2} + e_t \tag{3}$$

$$ROE_t = \beta_0 + \beta_1 PR_t + \beta_2 PR_t^2 + \beta_3 NPL_t + \beta_4 LDR_t + \beta_5 LEV_t + \beta_6 ROE_{t-1} + \beta_7 ROE_{t-2} + \beta_8 ROE_{t-3} + \beta_9 ROE_{t-4} + e_t \tag{4}$$

$ROE_{(t-1)}$ ,  $ROE_{(t-2)}$ ,  $ROE_{(t-3)}$ ,  $ROE_{(t-4)}$  which are also referred to as ROE(-1), ROE(-2), ROE(-3) and ROE(-4) in latter analysis, are respectively the lagged dependent variable with a lag of one, two, three, and four quarter(s). Model 3 focuses on examining the impact of the profitability of the past two quarters on the performance of the current quarter, while Model 4 covers the previous four quarters.

### 3.4. Descriptive Statistics and Correlation Analysis

**Table 2. Descriptive statistics and Correlation Analysis**

Variable	Obs	Mean	Std. dev.	Min	Max
ROE	440	0.034833	0.025275	-0.04701	0.148375
PR	440	0.059875	0.012195	0.04	0.1
NPL	440	0.020062	0.010784	0.0036	0.066306
LDR	440	0.909728	0.168173	0.542812	1.469094
LEV	440	10.9007	4.826421	0.791616	23.5309

Source: Researchers' computation using STATA 17

Table 2 shows the descriptive statistics of the data collected. The average value of ROE is 3.48%, which means a currency of equity generates a rather good return. The standard deviation of 2.53% shows that the coefficient difference in banks is quite high, implying that ROE varies among banks. The refinance rate has an

average value of 5.99%. The highest and lowest refinance rate are 4% and 10%, respectively, showing that the refinance rate has gone through fluctuations and changes during the research period. NPL ranges from 0.36% to 6.63%. The average NPL is around 2% which meets the requirements of the State Bank. The average LDR is 90.97%, ranging from 54.28% to 146.91%, indicating that banks use a large percentage of their deposits for lending activities. The average LEV is 10.9, which is a fairly high level. A high leverage ratio can help banks increase their ROE in the short term but in the long term, this can lead to a rising insolvency risk.

**Table 3. Pearson Correlation**

	ROE	PR	NPL	LDR	LEV
ROE	1.0000				
PR	-0.2818	1.0000			
NPL	-0.1860	0.2183	1.0000		
LDR	0.3451	-0.2882	-0.0038	1.0000	
LEV	0.0495	0.1176	-0.2064	-0.1585	1.0000

*Source: Researchers' computation using STATA 17*

Table 3 presents the Pearson correlation between the bank profitability index and the explanatory variables. The table demonstrates that there is no significant correlation among the dependent variables, given that the majority of the estimated correlations are less than 0.5. Therefore, it can be concluded significant multi-collinearity does not happen in the model.

ROE is negatively related to PR with a correlation value of -0.2818. This hints that a higher interest rate can be damaging to bank profitability. NPL is also negatively related to ROE, which implies credit risk harms bank performance. On the other hand, a positive relationship exists between ROE and LDR as well as LEV. This implies that banks that have higher LDR and LEV tend to generate higher ROE. From the correlation analysis, it can be seen that the expected relationship between ROE and explanatory variables seems to be correct.

## 4. RESULT AND DISCUSSION

### 4.1. Estimation Results

**Table 4. Estimation Results of Model 1 and Model 2**

	Model 1	Model 2
	ROE	ROE
PR	-0.409** [-2.49]	-1.589** [-2.51]
NPL	-0.289* [-1.86]	-0.285* [-1.85]
LDR	0.0459* [2.14]	0.0453* [2.18]
LEV	0.00135 [1.30]	0.00148 [1.40]
PR_Sq		9.565** [2.35]
_cons	0.0087 [0.32]	0.0426 [1.58]
N	440	440
R-sq	0.212	0.228

Note: \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

*Source: Researchers' computation using STATA 17*

Table 4 showcases the estimates of the models specified in equations 1 and 2. From Model 1’s estimate, it can be seen that the relationships between the dependent variable and the explanatory variables are mostly similar to our a priori expectation. However, only three out of the four variables are statistically significant. At the 5% significance level, PR has a negative relationship with ROE. This result is supported by Rao et al (2006) and Thanh Nhan et al (2016). NPL has an inverse relationship with ROE at 10%. Also at 10%, LDR has a positive effect on ROE. Leverage ratio also has a positive effect on ROE but is not statistically significant.

From Model 2’s estimate, PR has a negative effect on ROE, while the squared variable of PR has a positive effect on ROE, both at a significance level of 5%. This implies that the policy rate hurts the profitability of commercial banks, and this adverse effect is further amplified the longer a high policy rate is in effect. At 10%, NPL has a negative relationship with ROE, while LDR has a positive effect on ROE. LEV remains statistically significant to ROE.

**Table 5. Estimation Results of Model 3 and Model 4**

	<b>Model 3</b>	<b>Model 4</b>
	<b>ROE</b>	<b>ROE</b>
PR	-1.327*** [-3.71]	-0.803** [-2.85]
PR_sq	9.265** [3.14]	4.984** [2.33]
NPL	-0.0932 [-0.64]	-0.0788 [-0.70]
LDR	0.0211*** [3.47]	0.0109 [1.59]
LEV	0.000963* [1.82]	0.000809* [1.99]
ROE(-1)	0.276** [2.88]	0.221* [2.20]
ROE(-2)	0.200*** [3.77]	0.140** [3.09]
ROE(-3)		0.0875* [2.18]
ROE(-4)		0.177** [3.08]
_cons	0.0358 [1.79]	0.0263 [1.34]
N	437	431
R-sq	0.353	0.382

Note: \* p<0.1, \*\* p<0.05, \*\*\* p<0.01

Source: Researchers’ computation using STATA 17

Table 5 showcases the estimates of the models specified in equations 3 and 4. In Model 3, both ROE(-1) and ROE(-2) – the one lagged and two lagged variables of ROE – are significant at 5% and 1% respectively. This shows that the profitability of previous quarters does indeed affect the profitability of the current quarter. The coefficient of ROE(-1) is greater than that of ROE(-2), which indicates that the impact of a previous quarter’s ROE on the current quarter’s ROE increases with proximity to that quarter.

The result of Model 4 shows that the current quarter’s profitability is influenced by the ROE of the prior four quarters. As the lag lengthens, the values of the lagged variables’ coefficients decrease, with

ROE(-1) having the greatest coefficient at 0.2207. However, compared to ROE(-2) and ROE(-3), ROE(-4) has a greater coefficient. This demonstrates that although ROE(-1) still has the greatest influence on ROE, ROE(-4)'s influence on ROE is unique and notable.

Model 4's finding is complementary to that of Model 3. It suggests that a bank's profitability is significantly influenced by how well the bank has performed financially in the past, going back as far as four quarters. Especially, the profitability of a quarter from the current year will be significantly impacted by the profitability of the same quarter from last year. This can be explained by the seasonality in banking activities. For example, during Tet holiday, as the demand for banking activities increases, banks can earn more profits, and this pattern repeats annually.

#### **4.2. Discussion**

The results show that the policy rate has a negative impact on the ROE of commercial banks. In economic theory, when the Central Bank increases the policy rate, banks' lending activities are tightened. This restricting effect on lending will consequently have an impact on bank profitability as credit activities still account for the majority of Vietnamese commercial banks' profits. This is consistent with the fact that after the SBV decided to increase the rediscount rate and the refinance rate on October 24, 2022, the total outstanding loans of commercial banks in the fourth quarter of 2022 decreased significantly compared to the third quarter of 2022. Declining lending activity results in lower income, which harms bank profitability.

Moreover, the result also suggests that the policy rate not only adversely affects bank profitability but this detrimental effect will also intensify when the policy rate is kept at a high benchmark for an extended time. This shows that Vietnamese commercial banks are still heavily influenced by the policy management of the State Bank.

Regarding the bank-specific factors, non-performing loans have a negative effect on ROE. This is because an increased amount of NPL will lead to difficulties in debt collection, which reduces the profitability of commercial banks. LDR has a positive effect on ROE. This can be explained by the fact that an increase in LDR means that the growth rate of commercial banks' lending activities is stronger than the growth rate of total deposits. At Vietnamese commercial banks, the main source of income is still from lending activities. Therefore, when lending activities increase, the bank's profit also increases.

#### **5. CONCLUSION AND POLICY IMPLICATION**

Inflation control, a key to preserve macroeconomic stability, has been successfully achieved thanks to the SBV's conduct of interest rate policies. However, it's critical to consider the potential impacts of ongoing monetary tightening on the activities of commercial banks. The SBV must carefully evaluate how its monetary policy affects the profitability of commercial banks in order to address these concerns. Achieving a balance between reining in inflation and fostering an environment that allows banks to make a profit should be the goal of the central bank. This can be accomplished by setting an appropriate policy rate that takes into account the requirements for both the management of inflation and the stability of the banking system.

In contrast to developed countries where commercial banks have a higher level of independence, the influence of the central bank on commercial banks can be more pronounced in developing nations like Vietnam. In such circumstances, it is crucial that the SBV take the necessary steps to support the banking system and aid in its recovery after an increase in policy interest rates.

Additionally, the SBV should work closely with commercial banks by injecting targeted liquidity support, encouraging responsible risk management procedures and technological advancements in banking operations.

These initiatives can assist commercial banks in overcoming the difficulties brought on by monetary tightening while preserving their profitability and enhancing the overall stability of the banking industry.

One effective measure that the SBV can employ to support the banking system is implementing open market operations (OMOs) to inject liquidity. Through OMOs, the SBV can lower the liquidity pressures that commercial banks might experience as a result of higher interest.

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## RESEARCH ON THE IMPACT OF THE COVID-19 PANDEMIC ON CREDIT RISK AT VIETNAMESE COMMERCIAL BANKS

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**ABSTRACT:** *This paper researches the impact of the Covid-19 pandemic on credit risk at Vietnamese commercial banks (including 20 banks). This paper provides theories about credit risk and factors affecting credit risk. In addition, this paper also analyzes the current situation of credit risk before and after the appearance of the Covid-19 pandemic. Through previous research papers in the world as well as in domestic, the authors have built hypotheses and a model of non-performing loans (NPL) towards analyzing the factors impacting credit risk in the period from 2012 to 2021. These factors comprise non-performing loans (NPL) in the last year, return on equity (ROE), loan-to-deposit ratio (LDR), net interest margin (NIM), capital adequacy ratio (CAR), macro factors such as GDP, unemployment rate and other factors such as Covid-19. The NPL model results show that there are 7 factors impacting NL including NPL in the last year, ROE, LDR, NIM, GDP, unemployment rate, and Covid-19. While NPL last year and NIM have positive impacts on NPL, the remaining factors including ROE, LDR, GDP, unemployment rate and Covid-19 have opposite impacts on NPL. From the results gathered from the model, the authors have proposed solutions in order to limit credit risk at Vietnamese commercial banks in the context of the Covid-19 pandemic.*

*Keywords: Covid-19, credit risk, Vietnamese commercial banks.*

### 1. INTRODUCTION

Credit risk refers to the risk of potential loss to the bank if the borrowers fail to meet their obligations (Leo et al, 2019). There are many reasons for credit risk including macro environment (political, economic, social, technological, legal, and environmental factors), customers, banks, and collaterals. Besides these factors, Covid-19 is also a reason for credit risk.

According to WHO (2021), Coronavirus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus. The recent wave of the Covid-19 pandemic has had a negative impact on the overall economy. The economy has been severely affected by the stagnation of production and business activities, and many social and cultural activities have been also severely affected. Many businesses currently have had to declare dissolution or stop business operation due to the fact that they have not had enough financial resources to pay salaries to employees as well as pay debts to the company and banks, and this has been also one of the reasons for the increase in non-performing loans at the bank. According to the General Statistics Office, in the past nine months, 45,100 companies have temporarily suspended operations and 32,400 companies have closed their doors pending dissolution. Meanwhile, operating businesses also have faced many difficulties when revenue and cash flow have declined due to the COVID-19 pandemic.

In addition, the pandemic's lingering impact on households has become apparent. The sharp fall in income has led to financial difficulties, which has led to a sharp increase in household debt in Vietnam. Specifically, this group has accounted for half of the total outstanding loans of the whole market. In 2013, household loans accounted for only 28% of all Big 4 lending, but by 2020 the figure was 46%. This means that household debt has grown rapidly from 25% to 61% of GDP over the same period. The prolonged

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epidemic causes difficulties for businesses and customers, reducing capital turnover, disrupting cash flow, and reducing profits. This leads to an inability to pay debts as they come due and increases the risk of debt collection. According to the financial statements of the third quarter of 2021 of commercial banks, the absolute non-performing loan balance of 27 commercial banks has increased to 111 thousand billion VND, up 26% compared to the beginning of the year. In, ten banks increased their non-performing loans due to difficulties in the lending business because of the outbreak of the Covid-19 epidemic. Non-performing loans at state-owned commercial banks also increased sharply, accounting for most of the total credit of the whole industry.

After the call of the State Bank and Vietnam Banks Association, from mid-July 2021 until now, many commercial banks simultaneously cut loan interest rates to support customers to overcome difficulties caused by the Covid-19 epidemic. In addition, banks are also restructuring loans for affected customers to support customers affected by the COVID-19 pandemic. To support the Government and banks figure out more ideal and specific methods to minimize credit risk during and even after the Covid-19 pandemic, researching the impact of the Covid-19 pandemic on credit risk at Vietnamese commercial banks is extremely important.

Therefore, the aim of this study is to research the impact of Covid-19 on credit risk at Vietnamese commercial banks. So far, there have been very few studies on the impact of the Covid-19 pandemic on credit risk, simply because this pandemic has just appeared at the end of 2019 until now. Hence, this study contributes to a further understanding of how credit risk can be affected by epidemics.

There are seven parts in this research including introduction, theoretical framework, research method, result, conclusion, appendix and reference.

## **2. THEORETICAL FRAMEWORK**

There are very few studies on the impact of the Covid-19 pandemic on credit risk in the world in general and in Vietnam in particular.

### **2.1. In the world**

Previously, several researchers examined the effect of COVID-19 on credit risk in banks across countries such as Aldasoro et al (2020) and Agustin et al (2021). Riani (2021) has researched and shown the significant impact of Covid-19 on credit risk that banks in Indonesia face by quantitative method. The results show that Covid-19 has a negative effect on conventional commercial banks in Indonesia as the presence of Covid-19 increases non-performing loan cases causing the problem of excessive credit generation for conventional banks. During the pandemic, debtors prolong the repayment period of their loans, thus leading to the risk of default (Quanyun, Du, & Wu, 2021). In addition, the report of Ciobu and Tataru (2021) made on the basis of an analysis of the banking sector of the Republic of Moldova shows that the impact of the Covid-19 pandemic on credit risk in the banking sector is still ongoing, and forecasting potential losses. The researcher also pointed out that there were up to five challenges posed by Covid-19 to the credit risk environment, including changing creditworthiness at the sectoral and sub-sectoral levels; difficulty distinguishing between borrowers in the same subsector; lagging data on crisis conditions; the social responsibility policies needed to meet the changing preferences of customers and release a large wave of non-performing loans that needed to be addressed in a new way.

In the United States, regulations or verbal recommendations force banks to suspend dividend payments for 2020 through the end of 2021 due to the impact of the Covid-19 epidemic (Federal Reserve System, 2020). This has brought stability to the banking sector during the Covid-19 period which has been positively



impacted by the actions of financial supervisors. During the early stages of the pandemic, US banks largely lived up to society's expectations as banks served as important conduits for liquidity, credit, and loans (Buehler et al., 2020). With the strength of abundant capital and liquidity, banks moved quickly to protect their employees and customers. As this article predicts, credit losses for US banks could range from \$400 billion to \$1 trillion between 2020 and 2024 (Buehler et al., 2020).

Building on previous analyzes by European authorities, Aiyar et al (2021) created and developed a paper to assess the impact of the Covid-19 crisis on banks in Europe. This research highlights that the longer the crisis lasts, the higher the risk that banks will experience a significant deterioration in the quality of assets in their loan portfolios. Stagnant economic activity due to a delayed reopening will exacerbate borrowers' liquidity problems and increase outstanding loans, especially in vulnerable sectors. This will lead to much more likely credit losses and larger credit losses.

## **2.2. In Vietnam**

According to Dao Minh Tuan (2020), the Covid-19 pandemic has negatively impacted commercial banks' activities. Research has shown that Covid-19 has made many businesses unable to borrow capital or have no need to borrow because they have not signed a contract to sell goods. In 2020, consumer income increased compared to 2019, and deposits also increased despite a sharp decrease in interest rates, plus the increased risk of non-performing loans (especially debt groups with the ability to lose capital), and credit risks at banks and other financial institutions. Commercial banks will also increase, leading to a decline in profits as well as business efficiency of commercial banks. Besides, the study also mentions the difficulty of commercial banks when selling loan collateral to recover old non-performing loans.

In addition, Nguyen Thi My Yen et al (2021) stated that Covid-19 caused an increase in NPLs and a decrease in the credit market. The study also showed that the GDP of the economy in 2020 also increased compared to 2019.

Finally, Nguyen Duc Trung et al (2021) believe that the Covid-19 pandemic can reduce the value of collateral for credits as well as increase the NPLs of commercial banks. The increase in NPL has a negative impact on credit risk tolerance, thereby affecting credit risk at banks when banks have to increase credit provision.

## **2.3. Research gap**

Previous studies have mentioned some aspects of the impact of Covid 19 on the operations of banks. The gap is that some specific aspects of credit risk of commercial banks that have not been explored seem to be important and urgently needed for investigation in the context of the severe impact from Covid 19 in Vietnam. In this study, we seek to expand the factors affecting credit risk at commercial banks in Vietnam by addressing the gap from the impact of Covid 19 along with micro and macro factors.

## **3. RESEARCH METHOD**

### **3.1. Research sample**

The study collects data of Vietnamese commercial banks, but only 20 commercial banks have comprehensively data sources for the period we want to study, from 2012 to 2021. The reason we chose this time period is because the financial statements and annual reports of the 20 selected commercial banks are complete, while the years before 2012 were lacking.

### **3.2. Research data**

In this study, the NPL ratio is a dependent variable because it is used to represent credit risk. The NPL ratio is collected from financial statements over the period from 2012 to 2021 from 20 commercial banks.

There are eight independent variables including five micro-independent variables, two macro-independent variables, and a Covid-19 variable. While the micro-independent variables are gathered from financial statements and annual reports of 20 commercial banks over the period between 2012 and 2021, the macro-independent variables are collected from the General Statistics Office of Vietnam and the World Bank.

**Table 3.1: Measurement method of variables**

	Variables	Symbol	Measurement method
Dependent variable	NPL this year (year t)	NPL	NPL = Total non-performing loans this year/ Total outstanding loans this year
Micro-independent variables	NPL last year (year t-1)	NPL_1	NPL_1 = Total non-performing loans last year/ Total outstanding loans last year
	Return on Equity	ROE	ROE = Net profit/ Equity
	Loan to deposit ratio	LDR	LDR = Total loans/ Total deposits
	Net interest margin	NIM	NIM = (Interest received - Interest paid)/ Average invested assets
	Capital adequacy ratio	CAR	CAR = (Tier 1 Capital + Tier 2 Capital)/ Risk Wrihted Assets
Macro-independent variables	Gross domestic product	GDP	GDP = GDP growth rate of this year compared to last year
	Unemployment rate	UEM	UEM = The unemployment rate this year
Other variables	Year 2020,Year 2021	COVID	Dummy variable takes the value "1" for 2020 and 2021

*Source: Compiled by the research group*

### 3.3. Research model and hypothesis

#### 3.3.1. Research model

To assess the impact of Covid-19 on credit risk at Vietnamese commercial banks, based on previous research papers, the research group selected and used appropriate variables to build a research model. The research group used the following model:

$$NPL_{i,t} = B0 + B1*NPL_{i,t-1} + B2* ROE_{i,t} + B3* LDR_{i,t} + B4* NIM_{i,t} + B5* CAR_{i,t} + B6* COVID + B7* GDP_{i,t} + B8* UEM_{i,t}$$

In which,  $NPL_{i,t}$  is the dependent variable and the indicator to measure the credit risk of commercial banks.  $NPL_{i,t}$  is the NPL of bank  $i$  at time  $t$  ( $i$  is the symbol for the studied commercial banks,  $t$  is the symbol for the years in the research period). The dependent variable  $NPL_{i,t}$  is calculated by the sum of the substandard debt group (group 3), doubtful debt (group 4) and potentially losing debt (group 5) on total credit balance.

Based on data collection and characteristics of Vietnamese commercial banks, the research group has considered micro factors and macro factors affecting the NPL of commercial banks each year: (1) Group of micro variables tissues include  $NPL_{i,t-1}$ ,  $ROE_{i,t}$ ,  $LDR_{i,t}$ ,  $NIM_{i,t}$  and  $CAR_{i,t}$ . Besides, the group of macro variables includes  $GDP_{i,t}$  and  $UEM_{i,t}$  in Vietnam. The measurement methods and expected signs of the variables are shown in Table 3.1.

In the model, another variable is  $COVID_{i,t}$ , which is an indicator of the Covid-19 pandemic.

#### 3.3.2. Research hypothesis

After referring to some previous research papers, the research group came up with some hypotheses about the relationship between the independent variables and the dependent variable as follows:

**• NPL and NPL of previous year**

According to Nguyen Thi Nhu Quynh et al (2018), through a study on factors affecting non-performing loans at Vietnamese commercial banks, this research has shown that last year's NPL and this year's NPL have a positive relationship. Besides, Pham Hai Nam and Nguyen Ngoc Tan (2021) also show that last year's high NPL can also lead to this year's high NPL.

*H1: NPL and NPL last year have a positive relationship.*

**• NPL and ROE**

From the findings of Takang and Ntui (2008), it can be seen that ROE is negatively related to the NPL of commercial banks. Banks with higher profitability tend to be less motivated to engage in risky lending activities than is optimal, leading to higher NPL (Louzis et al., 2012; Curak et al., 2012). 2013; Makri et al., 2014). In addition, Nguyen Thanh Dat (2018) also showed that ROE has a negative impact on NPL because when increasing profits, banks will avoid risky activities, choose customers with good financial ability and less risk to increase profits. However, according to Tran Vuong Thinh and Nguyen Ngoc Hong Loan (2021), it is shown that ROE has a positive relationship with NPL because when commercial banks want to increase credit activities to increase profits, this means that NPLs increase.

*H2: NPL and ROE have a positive relationship.*

*H3: NPL and ROE have a negative relationship.*

**• NPL and LDR**

According to Buchory (2014), LDR is used to measure the degree of intermediation of the banking system has been implemented, serving to assess the creditworthiness or safety of banks. Cheng et al (2016) argue that the higher the LDR, the larger the total outstanding loans and the higher the non-performing loans. This conclusion is based on "The Moral hypothesis", Lee and Ho (2007) argue that if loans are too readily available in the financial system, financial institutions will absorb these excess funds as quickly as possible. When banks check loans, credit information systems are often inaccurate, and this causes a deterioration in the bank's loan quality and credit risk.

*H4: NPL and LDR have a positive relationship.*

**• NPL and NIM**

NIM is one of the indicators that can be used to measure a bank's performance to generate profits from the management of profitable or productive assets owned by the bank (Buchory, 2014). . According to Puspitasari et al (2021), net interest margin (NIM) is a measure of the difference between interest income earned by a bank or other financial institution and the interest paid by a bank to its lender (e.g. e.g. depositors), relative to their assets earning interest. In addition, Zheng et al (2018) conducted a study on the factors affecting credit risk on 22 banks in Bangladesh and found that NIM has a positive impact on NPL. Specifically, the researchers explain that a higher interest rate margin causes higher credit risk and burdens borrowers with their transactions as they struggle with interest burdens and market competition.

*H5: NPL and NIM have a positive relationship.*

**• NPL và CAR**

According to Demircuc-Kunt and Huizinga (1999), when CAR is high, banks will pursue opportunities

more aggressively, which means that higher risk-taking leads to riskier credit portfolios. The research group believes that CAR has a positive impact on NPL. In addition, through the study of factors affecting NPL at commercial banks in Barbados, Wood and Skinner (2018) also showed that the relationship between CAR and NPL is positive. Vatanserver and Hepsen (2013) also show a positive relationship between CAR and NPL through the study of non-performing loans in Turkey.

*H6: NPL and CAR have a positive relationship.*

#### • **NPL and GDP**

According to Kartikasary et al. (2020), the research group studied the factors affecting NPL in Indonesia and showed that the higher the GDP, the higher the NPL. In addition, according to Beck et al (2015), GDP and NPL have a positive relationship. However, according to Urmar and Sun (2018), through research at Chinese banks, the group has shown that GDP is one of the macro factors affecting the NPL ratio. The higher the GDP, the lower the NPL (Umar and Sun, 2018). Besides, the study of factors affecting NPL in the euro area by Makri et al (2014), at the Bank of Pakistan by Khan et al (2018) also shows that GDP has a negative effect. with the NPL ratio. In addition, research by Nguyen Thi Hong Vinh (2015), Nguyen Hoang Lam (2017), and Nguyen Thi Nhu Quynh et al (2018) also show that GDP and NPL have a negative relationship. The reason is that with higher GDP, the borrower's ability to repay debt is also increasing (Khan et al., 2018).

*H7: NPL and GDP have a positive relationship.*

*H8: NPL and GDP have a negative relationship.*

#### • **NPL and the unemployment rate**

Vatanserver and Hepsen (2013) and Mazreku et al. (2018) have shown that self-interest has a positive effect on NPL because as unemployment increases, the number of people having difficulty meeting debts increases, leading to an increase in NPL. In a study on the factors affecting NPL in Pakistani banks, Khan et al (2018) also show that the higher the interest rate increases, the higher the NPL. In addition, through the study of 14 countries in the euro area by using the regression method, Marki et al (2014) also identified that the increase in NPL is due to the growth of the unemployment rate. However, Nguyen Thi Nhu Quynh et al (2018) stated that NPL and the unemployment rate have an inverse relationship due to two reasons: (1) the low proportion of personal loans to total credit outstanding; (2) The unemployment rate in Vietnam is low, there is not much change.

*H9: NPL and UEM have a positive relationship.*

*H10: NPL and UEM have a negative relationship.*

#### • **NPL and Covid-19 (COVID)**

When studying the factors affecting NPL including Covid-19 in banks in Bosnia and Herzegovina, Zunic et al (2021) showed that the relationship between NPLs and Covid-19 is negative. This is because in Bosnia and Herzegovina, a ban on lending was introduced, which prevented an increase in NPL. However, in studying the impact of Covid-19 on NPL levels at commercial banks in Indonesia, Hardiyanti and Aziz (2021) showed that during the Covid-19 pandemic, NPLs increased. Therefore, Covid-19 and NPL have a positive relationship with each other.

*H11: NPL and COVID have a positive relationship.*

*H12: NPL and COVID have a negative relationship.*

## 4. RESULTS AND DISCUSSION

### 4.1. Results

#### 4.1.1. Descriptive statistics

A descriptive method is a method used to analyze data in a manner that describes or describes data that has been collected as-is, without the intention of applying general or general conclusions. The research group generalized descriptive statistics of the variables in Table 3.2 as follows:

**Table 3.2: Descriptive statistics of variables in the model**

Variables	Observations	Mean	Standard deviation	Min	Max
NPL	200	0,021	0,013	0,000	0,088
NPL_1	200	0,025	0,053	0,000	0,088
ROE	200	0,106	0,071	0,001	0,303
LDR	200	0,805	0,121	0,529	1,092
NIM	200	0,031	0,010	0,006	0,071
CAR	200	0,131	0,038	0,080	0,334
GDP	200	0,056	0,016	0,026	0,071
UEM	200	0,023	0,003	0,020	0,032
COVID	200	0,100	0,301	0,000	1,000

*Source: Compiled from Stata software*

According to Table 3.2, the NPLs of commercial banks from 2020 to 2021 have a mean of 2.11% with a standard deviation of 1.32%, a min value of 0.01%, and a max value of 8.82%. Meanwhile, NPL last year had a mean of 2.52%, a standard value of 5.31%, and min and max values of 0.01% and 8.82%, respectively. Thirdly, ROE has a mean of 10.63%, a standard deviation of 7.12% and a min value of 0.08%, and a max value of 30.3%. Fourthly, LDR has a mean of 80.47% and an LDR of 12.08%, together with a min value and a max value of 52.94% and 109.21%, respectively. Fifth, NIM has a standard deviation of 1.01%, a min value of 0.58%, a max value of 7.09%, and a mean of 3.05%. CAR has a min value of 8% and a max value of 33.42%, a mean of 13.11%, and a standard deviation of 3.84%.

For macro variables, GDP has a mean of 5.59%, a standard deviation of 1.55%, a min value of 2.58%, and a max value of 7.08%. UEM has a mean of 2.32%, a standard deviation of 0.33%, and min and max values of 1.99% and 3.22%, respectively. With the variable COVID, the mean is 0.1, the standard deviation is about 30%, and the min and max values are 0 and 1, respectively.

#### 4.1.2. Results

##### 4.1.2.1. Check correlation and multicollinearity

To check the correlation between variables and multicollinearity, the research group used the Pearson correlation matrix table according to Table 3.3 as follows:

**Table 3.3: Pearson's correlation matrix table**

	NPL	NPL_1	ROE	LDR	NIM	CAR	GDP
NPL	1,000						
NPL_1	0,406	1,000					
ROE	-0,372	-0,260	1,000				
LDR	-0,202	-0,144	0,077	1,000			
NIM	-0,037	-0,124	0,358	0,100	1,000		
CAR	0,259	0,191	-0,403	0,044	0,327	1,000	
GDP	0,029	0,088	-0,187	-0,052	-0,056	0,110	1,000
UEM	-0,219	-0,184	0,260	0,155	-0,040	-0,216	-0,720
COVID	-0,113	-0,136	0,133	0,047	-0,046	-0,195	-0,579

Source: Compiled from Stata software

To check the correlation between variables and multicollinearity, the research group used the Pearson correlation matrix table according to Table 3.3 as follows:

According to Gurajati (2004), if the correlation coefficient between the pairs of variables is greater than 0.8, the estimated model has a high possibility of multicollinearity. After that, the sign of the regression coefficients may be changed, causing the research results to be skewed. In Table 3.3, the correlation coefficients between all pairs of variables have absolute values less than 0.8. This means that the study model is not concerned about the possibility of double multicollinearity defects.

In addition, to quantify the degree of multicollinearity between the independent variables, the research group also used the variable inflation factor (VIF) to estimate (Table 3.4). VIF is used to check for multicollinearity in the regression equation. Multicollinearity will occur if  $VIF > 5$ . The results of the multicollinearity test by VIF are shown in Table 3.4 as follows:

**Table 3.4: Verification table for multicollinearity by VIF**

Variables	VIF	SQRT VIF	Tolerance	R-squared
NPL	1,470	1,210	0,679	0,321
NPL_1	1,270	1,130	0,786	0,214
ROE	1,970	1,400	0,508	0,492
LDR	1,100	1,050	0,910	0,090
NIM	1,760	1,330	0,568	0,432
CAR	1,800	1,340	0,554	0,446
GDP	4,680	2,160	0,214	0,786
UEM	3,480	1,860	0,288	0,712
COVID	2,260	1,500	0,443	0,557
Mean	2,200			

Source: Compiled from Stata software

According to Table 3.4, all variables have  $VIF < 5$ . This shows that the multicollinearity phenomenon occurring in the model is not too serious. Therefore, this is a positive sign for the selection and testing of the appropriate research model.

#### 4.1.2.2. Research model results

Three models Pooled OLS, FEM (Fixed Effect Model) and REM (Random Effect Model) were used in the study (Table 3.5). In which, according to Pooled OLS, the independent variables explain 32.14% of the dependent variable's variation (R square = 32.14%). However, to evaluate the cross-effect of time variables and banks as well as increase the fit of the model, the research group used FEM and REM (Table 3.5):

**Table 3.5: Regression analysis**

NPL	Regression analysis							
	Pooled OLS		FEM		REM		FGLS	
	Coef.	p-value	Coef.	p-value	Coef.	p-value	Coef.	p-value
NPL_1	0,258***	0,000	0,115*	0,081	0,258***	0,000	0,283***	0,000
ROE	-0,048***	0,002	-0,056***	0,003	-0,048***	0,001	-0,053***	0,000
LDR	-0,012*	0,089	-0,006	0,567	-0,012*	0,088	-0,009*	0,061
NIM	0,058	0,574	0,060	0,675	0,058	0,573	0,135**	0,012
CAR	0,007	0,805	0,005	0,894	0,007	0,805	-0,002	0,922
GDP	-0,371***	0,001	-0,423***	0,000	-0,371***	0,000	-0,392***	0,000
UEM	-1,439***	0,001	-1,691***	0,000	-1,439***	0,001	-1,908***	0,000
COVID	-0,010**	0,012	-0,012***	0,000	-0,010**	0,011	-0,011***	0,000
C	0,082***	0,000	0,091***	0,000	0,082***	0,000	0,091***	0,000
Observations	200		200		200		200	
R-squared	32,14%		29,93%		32,14%			
Prob>F	0,0000		0,0000		0,0000		0,0000	

“Significant level: \*:  $P < 0.1$ ; \*\*:  $P < 0.05$ ; \*\*\*:  $P < 0.01$ ”

Source: Compiled from Stata software

Of the three Pooled OLS, FEM, and REM, the FEM is the most suitable based on the F-test and Hausman test (Appendix 1 and 2). However, the research group tested the correlation phenomenon in the FEM (Appendix 3). Accordingly, the FEM encountered autocorrelation. Besides, the research group also tested the phenomenon of variance in the FEM (Appendix 4). As a result, the FEM also experiences variable variance. Therefore, the FGLS (Feasible Generalized Least Squares Estimators) is used to overcome the problems of the FEM (Table 3.5).

#### 4.2. Discussion

According to Table 3.5, there are 7 variables affecting NPL including NPL\_1, ROE, LDR, NIM, GDP, UEM, and COVID, excluding CAR. While NPL\_1 and NIM have a positive relationship with NPL, the remaining variables have a negative relationship. In which, the negative impact of COVID on NPL is about 1%.

For micro variables, last year's NPL has a positive relationship with this year's NPL at the significance level of 8.1%. Such a relationship has the same view as Nguyen Thi Nhu Quynh et al. (2018) and Pham Hai Nam and Nguyen Ngoc Tan (2021). The reason is that the non-performing loans of the previous year have not been thoroughly handled so far, which will increase non-performing loans this year (Nguyen Thi Nhu Quynh et al., 2018). Secondly, ROE negatively affects NPL. Felix and Claudine (2008), Louzis et al. (2012), Curak et al. (2013), Makri et al (2014), and Nguyen Thanh Dat (2018) also agree that the relationship between ROE and NPL is one reverse relationship. According to Takang and Ntui (2008), in order to increase profitability, banks will tend to avoid risky activities, in the case of credit, banks will consider and choose loans from other banks. customers with good financial capacity and low risk. Thirdly, LDR has a negative relationship with NPL, contrary to the expected sign given by the research group. Finally, NIM has a positive relationship with NPL, which is similar to the conclusion of Buchory (2014), Zheng et al (2018), and Puspitasari et al (2021). The reason is that the higher interest rate margin of commercial banks will lead to higher credit risk and create more burdens for borrowers.

For macro variables, GDP has a negative effect on non-performing loans. Such a conclusion is consistent with the study of Makri et al (2014), Khan et al (2018), Urmar and Sun (2018), Nguyen Thi

Hong Vinh (2015), Nguyen Hoang Lam (2017), and Nguyen Thi Nhu Quynh et al (2018). The higher the economic growth rate, the higher the income of individuals and organizations, therefore, the ability to repay debt and interest is also increasing. On the contrary, when economic growth slows down, borrowers' ability to repay both loans and interest decreases, leading to an increase in non-performing loans. Besides, the unemployment rate and NPL also have a negative relationship. This result is consistent with the studies of Nguyen Thi Nhu Quynh et al (2018). According to Nguyen Thi Nhu Quynh et al (2018), when the number of unemployed people is increasing, the number of customers doing credit transactions with banks decreases, leading to a decrease in non-performing loans. In addition, the unemployment rate in Vietnam is always low and does not fluctuate much. In the Vietnamese market, workers can do any job even if they are not specialized (Nguyen Thi Nhu Quynh et al., 2018).

Finally, similar to the conclusion of Zunic et al (2021), Covid-19 has a negative effect on NPL. The first reason is that the government has controlled the disease very well. Secondly, when the Covid-19 pandemic broke out in Vietnam, the State Bank flexibly and proactively operated monetary policy to remove difficulties for businesses and individuals with the goal of meeting credit capital needs for the economy and drastically dealt with non-performing loans. Thereby, the SBV has supported commercial banks to restructure existing debts for customers, exempting and reducing interest rates for businesses without revenue, and maintaining the same debt group. In addition, during the period of the Covid-19 epidemic, the low credit market, and reduced demand for bank loans of businesses and individuals are also the reasons why Covid-19 and NPL have an inverse relationship. Ultimately, not all industries are adversely affected by Covid-19 but on the contrary, some industries benefit from the pandemic. Banks have focused on making loans to industries benefiting from the Covid-19 pandemic such as medical equipment, telecommunications, etc. to avoid credit risk as well as earn profit.

## **5. CONCLUSION**

It is undeniable that banking is an industry that faces many kinds of risks including market risk, credit risk, operational risk, and liquidity risk, in which, credit risk is faced the most by banks. During the Covid-19 pandemic, credit risk at commercial banks has increased significantly. The reason is because the production and business activities of enterprises are interrupted, people's incomes are reduced, making it difficult to fulfill debt obligations.

The aim of the study is to research the impact of Covid-19 on credit risk at Vietnamese commercial banks. By collecting data from 20 Vietnamese commercial banks over the period from 2012 to 2021 as well as applying the regression analysis, Covid-19 has impacted negatively on credit risk. That means when the Covid-19 breaks out more strongly, credit risk will decrease. This is because of three main reasons. Firstly, the government has controlled the disease very well. Secondly, when the Covid-19 pandemic broke out in Vietnam, the State Bank flexibly and proactively operated monetary policy to remove difficulties for businesses and individuals to meet credit capital demand for the economy and drastically tackle non-performing loans. Moreover, not all industries are negatively affected by Covid-19 but on the contrary, several industries benefit from the pandemic.

In order to limit credit risk, commercial banks need to review and make eligible loans according to Circular 01 and Circular 03. Secondly, commercial banks need to evaluate each loan, Review the recoverability of each customer, ensuring the maximum possible recall. Besides, it is definitely important to have a provisioning plan close to the reality of the restructured credits. In addition, commercial banks should evaluate and review customers and have a selective credit growth orientation, and at the same time, carefully assess their financial situation, industry characteristics, and the business cycle. , etc. Furthermore,



it is essential for commercial banks to promote medium and long-term lending. Finally, Vietnamese commercial banks should focus continually on making loans to industries benefiting during the Covid-19 pandemic such as medical equipment, telecommunications, etc.

For the State Bank of Vietnam, it is necessary to maintain Circular 03. Besides, the State Bank should extend Resolution 42. Finally, it is important to increase capital to increase financial potential for commercial banks.

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# IMPACT OF OVERCONFIDENCE ON STOCK MARKET VALUATION: AN EMPIRICAL STUDY ON COMPANIES LISTED ON HO CHI MINH STOCK EXCHANGE (HOSE)

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**ABSTRACT:** *This study examines the impact of overconfidence bias among investors on firm valuation of listed firm on Ho Chi Minh stock exchange. The secondary data consists of 264 non-financial firms listed on HOSE in the period of 7 years from 2016-2022. This research employs the change in trading volume variable as a main variable proxy of overconfidence and applies FGLS method as the main estimation. As a result, this study confirms the positively affects of overconfidence bias on firm valuation on HOSE, regarding different investor overconfidence proxies. These empirical results have several implications for market regulators, investors, and academic researchers as well as for investment costs, capital allocation, and market effectiveness.*

**Key words:** *overconfidence, firm valuation, HOSE*

## 1. INTRODUCTION

Much of pioneer research has been conducted to investigate the impact of overconfidence psychology on investment decisions. Accordingly, understanding the impact of overconfidence on investor behavior and firm valuation can help investors, regulators, and policymakers to make informed decisions and reduce potential market distortions. In Vietnam, the number of research related to the nexus between overconfidence psychology among investors and stock valuation is still limited, despite its growing economy and stock market. This research gap presents an opportunity to fill the void in the literature and contribute to the understanding of the effects of overconfidence on firm valuation in an emerging market context.

This study is to identify the extent of overconfidence bias among investors in Vietnam's stock market and its impact on firm valuation. In addition, it is expected to provide practical recommendations for investors, regulators, and policymakers to mitigate the negative effects of overconfidence on firm valuation and promote a fair and efficient market in Vietnam.

## 2. THEORETICAL FRAMEWORK

### 2.1. Overview of overconfidence

#### 2.1.1 Overconfidence in psychology

Up to the 1970s, overconfidence in psychology has been defined as a particular form of miscalibration, for which related to the calibration and probability judgment that the answers given are correct exceeds the true accuracy of the answers. The most important extensions to this definition scope are studies of overconfidence in the context of positive illusions, which is the illusion of control and unrealistic optimism.

Calibration is considered to be appropriate "if over the long run, for all propositions assigned a given probability, the proportion that is true is equal to the probability assigned", (Koriat et al., 1980). Thus, a calibrated judge is capable of accurately estimating the number of errors he commits. Miscalibration is the

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discrepancy between the accuracy rate and probability assigned to indicate that a given answer is correct. The term overconfidence was considered as a specific type of miscalibration since the 1970s.

A number of psychological causes of overconfidence have been discussed in the past. Several reasons for overconfidence were summarized in the research of Dorota Skała (2008) namely self-motivation in cognitive processing, hard-easy effect, presence or lack of clarity.

First, Keren (1997) and J. E. Russo & Schoemaker (1992) assumed that overconfidence as a self-motivating mechanism in cognitive and psychological areas. Many factors within the cognitive process might cause a mismatch of confidence and accuracy. As a consequence of the faulty cognitive processing, heuristics and bias argumentation was marked as a potential origin of overconfidence. A partly cognitive and partly motivational reason for overconfidence is a so-called confirmation bias, widely explored in the literature of Koriat et al. (1980).

Second, the hard-easy effect was demonstrated as a reason for overconfidence when several authors argue that difficult issues are the cause of overconfidence, and that without them no miscalibration occurs. Gigerenzer (1991) argued that when questions are chosen at random, overconfidence diminishes and the hard-easy effect does not always dominate. The author indicated that overconfidence and the hard-easy effect may emerge, disappear, and invert depending on the task. However, numerous empirical researches demonstrated that the prevalence of overconfidence and the hard-easy effect as a general cognitive bias across domains has been strongly reduced and some results were associated with faulty interpretations of regression effects (Dawes & Mulford, 1996).

Third, the existence or absence of clear, quick feedback, which in some situations may lead to flawless calibration, has already been cited as a factor promoting overconfidence.

In addition, several investigations link varying amounts of overconfidence to gender difficulties, which supports the widely held assumption that males are more confident than women given the same level of knowledge (Barber & Odean, 2001). Yet, no definitive relationship has been identified between gender differences and overconfidence.

### **2.1.2 Overconfidence in finance**

According to Dorota Skała (2008), overconfidence in finance is typically described as an overestimation of one's familiarity with or accuracy with private information, or the interpretation of it. As an alternative, an underestimation of signal variance or asset value volatility are also taken into account.

Despite considerable skepticism among economists about the presence and impact of overconfidence, its ubiquity in financial markets has been consistently demonstrated using methodologies ranging from experimental and questionnaire research to formal models and financial market data, according to a study of Dorota Skała (2008). Several difficulties discovered on financial markets that could not previously be answered using normal economic theory were satisfactorily accounted for after investor overconfidence was adopted.

To date, numerous experimental evidences under various circumstances have been presented to support the existence of overconfidence on financial markets. Researchers have examined the presence of overconfidence and their implications on financial markets, such as excessive trade volumes, trading profitability, short and long-term asset misvaluations, and stock returns.

In terms of trading volume, overconfidence is demonstrated to lead to larger market depth and volatility. As demonstrated by Odean (1998), traders exhibit the better-than-average effect, evaluating their

information as better than that of their peers. Market players that are so overconfident boost trading volume. The similar conclusion is reached by Benos (1998).

In terms of trading profits, Kyle & Wang (1997) indicates that overconfident traders with excessively close private signal distribution intervals may be seen as trading more aggressively and may experience bigger profits than their rational competitors. Benos (1998) also came to a similar conclusion, stating that even though both overconfident and rational traders are aware of one another's tendencies, the overconfident traders benefit from a "first mover's advantage" and make higher individual profits. By contrast, Gervais et al. (2001) and Daniel et al. (1998) also show that overconfident informed investors incur losses on average, but they also suggest that overconfident traders may occasionally achieve returns that are higher than those of rational investors.

In terms of asset valuations, K. D. Daniel et al. (2001) proved that an asset pricing model with overconfidence leading to an equilibrium mispricing of securities. Some rational market participants take advantage of the pricing errors through arbitrage, but risk aversion prevents them from being completely eliminated.

## **2.2 Overview of firm valuation**

According to Shrivastava & Kumar (2015) a business valuation is defined as the process of estimating a firm's economic value. Shrivastava & Kumar (2015) confirmed that valuation is important in many aspects of finance. It is useful for portfolio management, mergers and acquisitions, corporate financing, as well as legal and tax considerations.

According to Shrivastava & Kumar (2015), there are three primary methods to valuation, including discounted cash flow valuation, relative valuation and pricing models. In another perspective, Shrivastava & Kumar (2015) expressed that valuation may be generally divided into three categories of asset-based, market-based, and earnings-based. To put it another way, there are two types of valuation procedures: direct valuation methods and indirect valuation methods, according to Shrivastava & Kumar (2015).

## **2.3 Literature review**

Behavioral theory forecasts that overconfident investors underestimate risk while overestimating the accuracy and quality of their information. As a result, they seek a smaller risk premium and have an excessively high demand for risky assets, which drives up asset prices and finally results in firm overvaluation. Several international researches have been conducted to investigate these predictions and majority of them show the positive relationship between overconfidence and firm valuation.

Adebambo & Yan (2018) investigated the relationship between overconfidence of investors and firm valuation by measuring the overconfidence among investors drawn from the characteristics and holdings of US stock mutual fund managers. The data was collected monthly in the period of 1988 – 2010 including stock return, standard industrial classification code, trading volume, share price, and shares outstanding for common stocks except for financial enterprises. As a result, they found that overconfidence among investors is strongly related to firm value and corporate actions. More specifically, Adebambo & Yan (2018) discovered that companies with more overconfident investors are considerably overpriced, according to the market to book ratio and a misvaluation metric.

Zia et al. (2017) further aim to test the overconfidence bias of investors in the Karachi stock exchange (Pakistan) by using a simple random sample approach from 2005 to 2013. Applying market-wide panel

VAR model and econometric techniques, Zia et al. (2017) performed that investors are overconfident in the Pakistani stock market since turnover is strongly related to stock returns. The findings have significant meanings for investors and brokers in terms of designing effective trading strategies. In addition, the study suggested that overconfidence bias tends to hinder portfolio diversification and promote excessive trading in Pakistan's financial market.

According to Bouteska & Regaieg (2020), there was a positive relationship between investor overconfidence on firm valuation. Their research examines how overconfidence and loss aversion biases affect US company performances. The population of insured industrial and service enterprises in the US was the subject of about 6,777 quarterly observations utilized in this study, which ran from 2006 to 2016. The study's hypotheses were tested using two panel data models with ordinary least squares (OLS) regression. In conclusion, the paper proved that the economic success of US firms is shown to be severely impacted by investors' pessimism indicating loss aversion, whereas investors' optimism expressing overconfidence positively impacts company stock market performance.

Overconfidence and disposition effect in the stock market is studied by Trejos et al. (2019) by collecting primary data about the characteristics of participants and the decisions made by them in each of the rounds. By using a methodology of combining qualitative (QCA) and logistic regression techniques, they concluded that overconfidence is explained by gender, career and education level, while age, nationality, and profits are not significant variables. In addition, they illustrated that overconfidence among investors leads to stock overpricing because overconfident investors overestimate the quality of their knowledge while underestimating the risk in the stock. However, this study faced a limitation when they were only able to assemble 77 participants who didn't involve participants that work as professional traders.

A recent research of Aljifri (2023) has investigated how overconfidence influences business value in Saudi Arabia's developing stock market. The fixed-effects panel data model and the dynamic panel data model are applied on a sample of 4004 firm-quarter observations covering 11 years, from 2009 to 2019. To measure the valuation of firms in the Saudi stock market, this study used Tobin's Q ratio as a dependent variable. According to the panel regression model, the author indicated that investor overconfidence positively and significantly affects the valuation of companies in the Saudi stock market. The findings provide an explanation for the nexus between overvaluation and mispricing in emerging markets, especially Saudi Arabia's stock market.

In Vietnam, there is no literature that examines how investor bias affects firm valuation. In order to determine whether biases influence investor decision making, only a few research have looked at the effect of investor bias on decision-making processes. To my best knowledge, just several documents related to the overconfidence in investment while only one Vietnamese research focus on trading behavior of investors and their investment decision such as the paper of Ly Hai Thi Tran & Tuan Pham Le Anh (2012).

In 2012, Ly, T. T. H., & Tuan, P. L. A. tested the existence of excessive optimism and overconfidence among Vietnamese investors on stock exchange and explored its impact on trading behavior of investors. A two-step data collection method is applied on a sample of 150 individual investors with trading accounts at two securities companies in Ho Chi Minh city to examine psychological factors with investors' trading activities. The survey was conducted from February to March 2012 by sending directly to investors or via email. Within 800 questionnaires sent out, only 274 answers were collected. Research results indicated that overoptimism and overconfidence do exist in the majority of investors



and they have a statistically significant effect on the trading turnover ratio of investors. To sum up, these results implied awareness for individual investors in making investment decisions. However, this study only focuses on examining the impact of over-optimism and overconfidence on investors' trading activities and ignores the influence of investor biases on the behavior of stock markets, such as mispricing and market valuation.

### **3. RESEARCH METHOD**

#### **3.1 Definition of variables**

##### **3.1.1. Dependent variable**

This study used Tobin's Q ratio as a dependent variable to measure the valuation of firms. Using Tobin's Q ratio has become a common method of assessing the fair or equilibrium value of the stock market, following by Brainard & Tobin (1968), Buchanan et al. (2018), Daines (2001), Fang et al. (2009), Gompers et al. (2003), Kumar & Singh (2013), Aljifri (2023). At the most basic level, the Q Ratio is a means of estimating whether a given business or market is overvalued or undervalued.

##### **3.1.2. Independent variables**

Independent variables used in this study are overconfidence proxies, including four alternative variables, namely the change in trading volume, turnover rate, excessive trading and the increase in the number of shares outstanding.

First, the change in trading volume (CTV<sub>*it*</sub>) is used as an independent variable, which is calculated from the change in trading volume as either an increase or a decrease in trading volume relative to its prior period. Alsabban & Alarfaj (2020) indicated that overconfident investors believe in their abilities and will act based on the information they obtain, trading volume is affected, therefore, the change in trading volume can be considered as evidence of overconfidence.

Second, turnover rate (turnover<sub>*it*</sub>) is employed as a proxy for the level of overconfidence because if current trading volume can be explained by the past market return, it can be considered as measurement of overconfidence. In addition, this study prefers turnover rate since it is a relative measure which eliminates the influence of growth in the long research period of 2016 - 2022 (Z. Chen et al., 2011).

Third, this study provides alternative variables to evaluate the level of overconfidence, namely excessive trading (ET<sub>*it*</sub>) and change in number of shares outstanding (ISO<sub>*it*</sub>). The reason why these variables are considered as alternative variables is that excessive trading (ET<sub>*it*</sub>) and change in number of shares outstanding (ISO<sub>*it*</sub>) were widely used as a proxy for overconfidence, however, the justification for using the proxy variable of shares outstanding may be less obvious and the manifestation of excessive trading is hazy.

##### **3.1.3 Control variables**

Control variables used in this study consists of market capitalization, return on assets and financial leverage. First, marketcap<sub>*it*</sub> defined as logarithm of the market capitalization is employed as a control variable to control for any influence on environmental strategy and performance. It is expected to be positively associated with corporate valuation, according to Liu & Magnan (2011), Issar (2017). Second, return on assets is added in order to measure financial performance for a particular time period. Third, the current study considers leverage as one of control variables for firm valuations since it represents a company's financial risk profile, according to McGuire et al. (1988) and Orlitzky & Benjamin (2001).

### 3.2. Database

This study investigated the quarterly sample of 264 non-financial companies listed on HOSE in the period of 2016 – 2022.

First, the reason why the quarterly frequency is chosen is that, for calculating Tobin's Q ratio measuring firm valuation and other firm-specific attributes in our sample such as market capitalization, return on assets and financial leverage, a few of these variables are disclosed with the HOSE on a quarterly basis.

Second, the financial and insurance firms are excluded from the current study due to the significant differences in practices and accounting methods as well as the numerous of regulatory restrictions among non-financial and financial firms. It is proved to make capturing the effect of investor psychology on firm valuation more difficult, according to Abed et al. (2012), Estrin et al. (2009) Jiraporn et al. (2009). Similar to previous research of Adebambo & Yan (2018) and Bouteska & Regaieg (2020) indicated that excluding financial firms helps to avoid distorting the results as well as contributes to a better exploration and analysis.

### 3.3 Research methodology

The panel data model is seem to be an optimal method because the cross - sectional and time-series dimensions offered by the panel data model have the benefit of enabling the researcher to compensate for unobserved heterogeneity. However, to guarantee that our conclusions are resistant to both unobserved firm-specific heterogeneity and endogeneity problems, this study uses four different methods to model regression, including least squares regression method (Pooled OLS), fixed factors effect method (FEM), random factors effect method (REM) and random effects model (FGLS) estimation method.

This study applies three different regression models to examine the impact of overconfidence on the valuation of companies listed on the HOSE by focusing on a main model, then 2 alternative models are used to ensure the results are not sensitive for the variable proxy.

Firstly, in the main model this study uses two independent variables measuring overconfident investors, namely change in trading volume ( $CTV_{it}$ ) and turnover rate ( $turnover_{it}$ ), which is popularly used before (Alsabban & Alarfaj, 2020; Asaad, 2020; Barber & Odean, 2001; Deaves et al., 2009; Chuang & Lee, 2006; Griffin et al., 2007; Statman et al., 2006; Tekçe et al., 2016; Trejos et al., 2019; Aljifri, 2023). The main model to examine the effect of overconfidence on the valuation of companies listed on the HOSE is written as follows:

$$Tobinq_{it} = \beta_0 + \beta_1 Marketcap_{it} + \beta_2 ROA_{it} + \beta_3 LEV_{it} + \beta_4 CTV_{it} + \beta_5 Turnover_{it} + \varepsilon_{it} \quad (1)$$

Secondly, this study re-examined the hypothesis using 2 alternative variable proxies for investor overconfidence to ensure the results are not sensitive for the variable proxy and to check the robustness of research's findings. Thus, two alternative models are expressed as below:

$$Tobinq_{it} = \beta_0 + \beta_1 Marketcap_{it} + \beta_2 ROA_{it} + \beta_3 LEV_{it} + \beta_4 ET_{it} + \varepsilon_{it} \quad (2)$$

$$Tobinq_{it} = \beta_0 + \beta_1 Marketcap_{it} + \beta_2 ROA_{it} + \beta_3 LEV_{it} + \beta_4 ISO_{it} + \varepsilon_{it} \quad (3)$$

Where:  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$ ,  $\beta_4$  and  $\beta_5$  are the coefficients of market capitalization, ROA, leverage, and overconfidence proxies, respectively;  $\varepsilon_{it}$  is the error term;  $i$  is a company, which sampled 264 companies listed at the HOSE;  $t$  represents time in quarters that covers the period of 2016-2022.

Our hypothesis is supported by a part of literature reviewing that demonstrated how overconfidence bias affects the valuation of firms listed on the Ho Chi Minh stock exchange (HOSE). The hypothesis of this study is written as below:

*H0: Overconfidence psychology positively affects the valuation of firms listed on the Ho Chi Minh stock exchange (HOSE).*

### 3.4. Model selection

The FEM model, however, is not certain to be an optimal model. Hence, several tests have been conducted to identify the most optimal one for the research.

**Table 1. F-test results**

	F-test	Prob > F
<b>Model 1</b>	71.66	0.0000
<b>Model 2</b>	42.05	0.0000
<b>Model 3</b>	4.86	0.0000

**Table 2. Breusch-Pagan test result**

	chibar2	Prob >chibar2
<b>Model 1</b>	25540.20	0.0000
<b>Model 2</b>	12940.27	0.0000
<b>Model 3</b>	122.98	0.0000

**Table 3. Hausman test results**

	chi2	Prob > chi2
<b>Model 1</b>	158.33	0.0000
<b>Model 2</b>	182.73	0.0000
<b>Model 3</b>	57.16	0.0000

**Table 4. Wald test results**

	chi2	Prob > chi2
<b>Model 1</b>	1.9e+33	0.0000
<b>Model 2</b>	4.6e+06	0.0000
<b>Model 3</b>	1.2e+34	0.0000

**Table 5. Wooldridge test results**

	F-test	Prob > F
<b>Model 1</b>	116.915	0.0000
<b>Model 2</b>	114.883	0.0000
<b>Model 3</b>	3.089	0.1293

*Source: Results from Stata 14*

F-test results indicate that all of Prob > F = 0.000 in three models, which is smaller than the significance level of 5%. Therefore, the thesis has enough conditions to reject H0, accept hypothesis H1. Thus, thesis H0 is rejected and thesis H1 is accepted. It means that a FEM method will be more optimal for model (1), (2), (3) than Pooled OLS. According to Breusch-Pagan test results, in all of three models, Prob > chibar2 = 0.0000 and these are smaller than the significance level of 5%. Therefore, we reject thesis H0 and accept thesis H1. To sum up, a REM method will be more optimal for model (1), (2), (3) than Pooled OLS. Hausman test results show Prob > chi2 = 0.0000 in all of three models, and with p-value of less than 5%, the H0 hypothesis is rejected. It means that FEM is more suitable for model (1), (2) and (3).

After using the F-test, Breusch-Pagan test and Hausman test, the FEM model is selected to be the most suitable model for research data. However, there is a probability that the FEM model has defects which make the regression results ineffective. Thus, this research applies two tests to investigate whether the FEM method has defects or not.

By using results of Wald and Wooldridge test from Stata, it was concluded that using the FEM method is not much significant because of heteroskedasticity and first-order autocorrelation in model 1 and 2 and there is heteroskedasticity in model 3. Therefore, the FGLS method will be applied to improve and eliminate the above disadvantages of the FEM method. To sum up, FGLS is demonstrated to be an optimal method for this study to examine the nexus between overconfidence and firm valuation.

**4. EMPIRICAL RESULTS AND DISCUSSION**

**4.1 Descriptive statistics**

**Table 6. Statistical table of variables**

Variable	Observations	Mean	Standard deviation	Minimum value	Maximum value
Tobinq	7,314	1.2472	0.8071	0.1727	11.0317
Marketcap	7,199	27.5890	1.5774	23.9119	33.3439
ROA	7,230	0.0689	0.0854	-1.0837	0.6127
LEV	7,230	0.4637	0.2154	0.0000	1.2900
CTV	7,114	4.8771	24.4403	-1.0000	1599.8460
ET	4,597	7.7780	30.0104	0.0002	1599.8460
Turnover	7,122	0.0039	0.0066	0.0000	0.0721
ISO	704	0.2515	0.3758	0.0000	4.7850

*Source: Results from Stata 14*

First, Tobin’s Q ratio is the dependent variable in the current study. The mean Tobin’s Q ratio of these examined firms was 1.2472, which is greater than 1. According to the definition of Tobin’s Q ratio, a high Q ratio of greater than 1 implies that a stock is more expensive than the replacement cost of its assets, which indicates that the stock is overvalued. In other words, the majority of 7,314 available observations for Tobin’s Q expressed an overvaluation.

Second, independent variables in this study include change in trading volume ( $CTV_{it}$ ), turnover rate ( $Turnover_{it}$ ), excessive trading ( $ET_{it}$ ) and an increase in the number of shares outstanding ( $ISO_{it}$ ). Firstly, the main variable measures overconfidence is change in trading volume ( $CTV_{it}$ ) had a mean of 4.8771% with a standard deviation of 24.4403, which is significantly huge. It can be explained by the characteristics database which includes all 264 non-financial firms listed on HOSE with different size and industry. Secondly, the standard deviation of turnover rate variable ( $Turnover_{it}$ ) states at 0.0066, which is significantly low. Thirdly, excessive trading ( $ET_{it}$ ) is similar to the change in trading volume since it is defined as a positive value of the change in trading volume only. Finally, there are only 704 observations of an increase in the number of shares outstanding ( $ISO_{it}$ ) throughout the period of 7 years from 2016 to 2022. The reason is that  $ISO_{it}$  will be null if there is no change or a decrease of number of shares outstanding. The maximum value and minimum value of  $ISO_{it}$  are 4.785% and 0% respectively.

Third, there are 3 control variables in the current study, consisting of market capitalization ( $Marketcap_{it}$ ), return on assets ratio ( $ROA_{it}$ ) and financial leverage ( $LEV_{it}$ ). Over 7,199 observations of  $Marketcap_{it}$ , which is defined as logarithm of the market capitalization, the mean value is 27.5890, with the standard deviation of 1.5774. The sample data has a mean ROA of 0.0696, and the average leverage is 0.4687.

**4.2. Correlation analytics**

According to Cohen et al. (2013), the results of a correlation analysis will indicate whether or not there is a relationship between the dependent variable and the independent variables. As shown in table 2, there is a positive relationship between the primary measure of overconfidence ( $CTV_{it}$ ) and Tobin’s Q, at 0.0086. It provides initial evidence that overconfidence of investors is strongly and positively associated with firm valuation. For sample firms, the correlation between turnover and tobinq is negative, which is in contrast with an expectation of the current study. Besides, the Tobin’s Q ratio variable measured market valuation

is positively and highly correlated with market capitalization and ROA, while it is negatively correlated with leverage. It is the same as research's expectation. Finally, the highest correlation is between ROA and Tobinq, which can cause multicollinearity.

**Table 7. Correlation matrix in the main model**

	Tobinq	Marketcap	ROA	LEV	CTV	Turnover
Tobinq	1.0000					
Marketcap	0.4725	1.0000				
ROA	0.6016	0.3080	1.0000			
LEV	-0.2345	-0.0572	-0.4059	1.0000		
CTV	0.0082	0.0245	-0.0325	0.0110	1.0000	
Turnover	-0.1063	0.1000	-0.1051	0.0970	0.0656	1.0000

Source: Results from Stata 14

To guarantee that the research model does not have multicollinearity, this study uses a variance inflation factor (VIF) test. The results from Stata indicate that the VIF values of all variables are at around 1, which is much lower than 10. Meanwhile, a VIF of greater or equal to 10 is often thought to indicate harmful collinearity, though problems are possible with lower VIF values (Franke, 2010). Therefore, it can be concluded that there is no multicollinearity problem among independent variables.

#### 4.3. Regression results

Table 3 summarizes the regression results of the main model by four different research methods of Pooled OLS, REM, FEM, FGLS, respectively. However, this research will focus only on the FGLS result in the result discussions since it is demonstrated as the most optimal model for the current study.

**Table 8. Regression results**

	FGLS (1)	FGLS (2)	FGLS (3)
Marketcap	0.176***	0.158***	0.178***
	-35.13	-28.39	-10.12
ROA	4.411***	4.303***	5.549***
	-47.64	-37.45	-14.84
LEV	-0.0336	-0.110**	-0.230*
	(-0.96)	(-2.53)	(-1.72)
CTV	0.000682**		
	-2.47		
Turnover	-10.32***		
	(-9.86)		
ET		0.000482*	
		-1.72	
ISO			0.125*
			-1.86
_cons	-3.848***	-3.336***	-4.006***
	(-28.41)	(-22.08)	(-8.25)
N	6917	4582	680

*t* statistics in parentheses, \*  $p < .1$ , \*\*  $p < .05$ , \*\*\*  $p < .01$

Source: Results from Stata 14

#### 4.4. Result discussions

The current research examines the hypothesis H0 stated that overconfidence bias positively affects the valuation of companies listed in the Ho Chi Minh stock exchange. After presenting the regression results, this study focuses on discussing results and then, comparing these results with the findings of other authors. To identify the impact of overconfidence psychology on the valuation of companies listed on the HOSE, the Feasible Generalized Least Squares (FGLS) is employed as clarified in the methodology part.

On the one hand, the regression results in the main model will be examined.

Firstly, investor overconfidence is expected to have a considerable and favorable impact on the value of firms listed on HOSE and, consequently, the value of the stock market. The regression result reports that the primary measure of overconfidence (CTV) has a positive coefficient of 0.0006819 and p-value of  $0.013 < 0.05$ . This value indicates that a rise in the change in trading volume variable of one unit leads to an increase in the Tobin's Q ratio of 0.0006819 units, holding other variables in the model constant. In addition, overconfidence is statistically significant on the valuation of companies listed on HOSE. This result is consistent with the H0 hypothesis of the current study and similar to the research results of Adebambo & Yan (2018), Bouteska & Regaieg (2020), Trejos et al. (2019) and Aljifri (2023). As clarified in the data section, overconfident investors believe in their abilities and will act based on the information they obtain, therefore, overconfident investors trading more actively and taking higher risk than sensible investors, is the reason for the high levels of trading activity on financial markets (Odean, 1998).

Secondly, the turnover rate variable has a negative coefficient of -10.3179 with p-value of lower than significant level of 5%. The value of coefficient is in contrast with an expectation before. According to the research of Statman et al. (2006), Tekçe et al. (2016) and Aljifri (2023), turnover rate is employed as one of independent variables. Turnover rate, defined as the ratio of the number of shares traded to the number of shares outstanding, is calculated quarterly for each period and firm. With this calculated formula, turnover rate eliminates the influence of growth during a long period. In fact, the current research examines a research period of 7 years from 2016 to 2022 while the period of 2019-2022 saw the considerable growth of the Vietnamese stock market. Thus, regression results between turnover rate and firm valuation might not be optimal and realistic.

Thirdly, the coefficients of all control variables are matched with an expectation of the current research. Both market capitalization ( $Marketcap_{it}$ ) and return on assets ( $ROA_{it}$ ) have p-value of 0.0000 and positive coefficient of 0.1759 and 4.4106, respectively. It reports that market capitalization and return on assets are positively affected and statistically significant on the valuation of non-financial firms listed on HOSE. However, leverage variable ( $LEV_{it}$ ) has a p-value of 0.3360 which is higher than a significant level of 5%. Hence, in this model leverage variable has no statistical significance on firms valuation listed on HOSE.

On the other hand, the regression results in the second and third model will be examined. To ensure our results are not sensitive for the variable proxy and to check the robustness of the research's findings, the current study provided alternative variables to measure the overconfidence level of investors, listed as excessive trading ( $ET_{it}$ ) and an increase in the number of shares outstanding ( $ISO_{it}$ ). Two additional regression models are conducted for each of two alternative proxies to capture the effect of overconfidence on the valuation of companies listed on the HOSE. As a result, the study finds that alternative proxy variables are statistically significant at 10% and similar to the H0 hypothesis.

Firstly, the coefficient of excessive trading ( $ET_{it}$ ) states at 0.0004815 and p-value is 0.086. It can be concluded that overconfidence, which is expressed by excessive trading variables, has positively affected the firm values of 264 non-financial listed companies on HOSE, at a significant level of 10%. This result is similar to the nexus between change in trading volume ( $CTV_{it}$ ) and firm valuation since excessive trading is extracted on change on trading volume variables ( $CTV_{it}$ ).

Secondly, overconfidence, in the third model, positively affects the firm valuation of non-financial firms listed on HOSE, which is similar to research findings of Aljifri (2023). It is derived from table 3, when the coefficient of an increase in the number of shares outstanding variable ( $ISO_{it}$ ) is positive, at 0.1255 and p-value is 0.063. In addition, in both additional models, the regression result of other independent and control variables is similar to the main model and matched with the  $H_0$  hypothesis, at a significant level of 10%.

To sum up, the research results on the alternative measurement of investor overconfidence proxies shows that all results are statistically significant. Despite different proxies for investor overconfidence in current investigation, there are consistent results when three of four overconfident proxies indicate the positive impact on firm valuation of listed firms on HOSE. It demonstrates that using the alternative overconfidence metrics has no effect on the report's results. In addition, the positive impact of overconfidence on firm valuation on listed stocks on HOSE is concluded to not be sensitive for the variable proxy. As a result, the current study can arrive at the conclusion that there is a positive and significant relationship between investor overconfidence and the valuation of firms listed on the HOSE thanks to the establishment of reliable measurements for investor overconfidence. This findings are consistent with research results of Bouteska & Regaieg (2020), Adebambo & Yan (2018), Aljifri (2023).

## 5. CONCLUSIONS AND RECOMMENDATIONS

### 5.1. Conclusions

The current study examines the impact of overconfidence of investors on firm valuation on the sample of 264 non-financial firms listed on HOSE in the period of 7 years from 2016-2022. This research employs the change in trading volume variable as a main variable proxy of overconfidence and applies FGLS method as the main estimation.

The current study arrives at several outcomes. Firstly, this paper confirms the positive and significant nexus between investor overconfidence and the firm valuation of sample firms listed on the HOSE. Secondly, to check the robustness of our findings, two additional robustness and sensitivity analyses are provided in this study. As a result, all of the results on two alternative regression models support and confirm the conclusions derived from the main model.

To sum up, regarding different investor overconfidence proxies, all proxies were statistically significant and generated consistent results when used in our analysis. These empirical results suggest that investors in the Vietnamese stock market are affected by overconfidence bias, and such a bias has been neglected by traditional financial theory. These findings are consistent with research's prediction and other related research (Bouteska & Regaieg, 2020; Adebambo & Yan, 2018; Aljifri, 2023).

### 5.2. Recommendations

To my best knowledge, this study is the first quantitative research of investor overconfidence's effects in Vietnam on the valuation of firms listed on HOSE. As a result, the findings are believed to have implications for market regulators, investors, and academic researchers as well as for investment costs, capital allocation, and market effectiveness.

First, the findings of the current study shows that overconfidence psychology of investors positively and significantly affects firm valuation. These results could increase investors' awareness of the influence of their own psychological factors, especially overconfidence bias, on asset pricing and market valuation, leading to more rational stock market decision-making for increased market efficiency. Thus, there are several implications for investors. Firstly, overconfident investors tend to trade more actively and are willing to take higher risk than sensible investors, hence they tend to overvalue stocks and set unrealistic expectations for their investments. As a consequence, this can result in disappointment and frustration. The research findings suggest that investors should set realistic goals and expectations for their investments based on historical performance and market trends. Secondly, overconfidence can lead investors to make hasty decisions without fully understanding the risks and opportunities involved. Hence, to eliminate the impact of overconfidence psychology on investment decisions, investors should keep themselves up-to-date with the latest news and trends in the markets, and conduct thorough research before making any investment decisions. Thirdly, based on behavioral finance theoretical models, overconfident investors often rely heavily on their overestimated knowledge. Additionally, the study indicates that there is an overvaluation phenomenon among overconfident investors on listed firms on HOSE. Therefore, it is necessary for investors to diversify their portfolio across different asset classes and sectors instead of putting all their eggs in one basket that they are highly expecting, which can lead to devastating losses if that one investment fails.

Second, this study implicated several recommendations for market regulators. Firstly, market regulators can reduce the disadvantage of overconfidence psychology on investment decisions of investors by educating. Regulators can introduce investors about the risks of overconfidence and how to avoid it by providing educational resources, such as investor guides, seminars and online tools, which help investors make informed decisions and manage their risks. In addition, market regulators should collaborate with other regulators and stakeholders, such as industry associations, academic institutions, and international organizations, to conduct empirical studies on the impact of overconfidence psychology on investment. Then, share information and aware participants of investment mistakes could be taken due to overconfidence. This can help promote consistency and effectiveness in regulatory approaches across different markets and jurisdictions. Secondly, it is necessary for market regulators to monitor and regulate market activities to prevent fraudulent or manipulative practices, such as insider trading, and other abuses that can contribute to overconfidence among investors. This can help maintain market integrity and protect investors from potential losses.

Final, the results of this study may provide evidence for behavioral theories in academic research that assert investor psychology has an impact on asset pricing, especially stock valuation. These findings suggest investor behaviors, especially overconfidence psychology should be taken into consideration when researching asset pricing models.

### **5.3. Research limitations**

Because of Vietnamese stock market characteristics, a possible limitation of the current research relates to data availability. Due to the lack of data, it is difficult to use more proxies to measure investor overconfidence, such as earnings forecast deviation proxy as research of Lin et al. (2005). In addition, the limited scope of available data presents some obstacles as its interpretation does not always provide answers as expected.



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## IMPACT OF ATTENTION ON FINANCIAL TO THE PERORMANCE OF VIETNAM COMMERCIAL BANKS

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*ABSTRACT: Financial technology is developing more and more, the fact that commercial banks instead of “confronting” with financial technology companies have “shaken hands” with them, thereby being able to overcome the shortcomings of traditional business, take advantage of the advantages that financial technology brings and increase the competitiveness of commercial banks themselves. The study evaluates the impact of interest in financial technology on the operation of Vietnamese commercial banks through profitability. In this study, the team took data from 21 commercial banks operating in Vietnam and used the level of search on Google with the keyword “Fintech” in Vietnam from January 2014 to the end of December 2022. use Google Trends. Aim to show that the level of public interest in financial technology in Vietnam has a positive influence on the operation of commercial banks. This is demonstrated by its high profitability. There are recommendations and suggestions to related objects and subjects to overcome the shortcomings and limitations.*

*Keywords: Fintech, commercial bank, profitability, financial technology*

### 1. INTRODUCTION

Breakthroughs in financial technology (Fintech) have been reshaping the way banks operate and provide banking services and have become the foundation of the trend of digitizing banking services. FinTech applications appear in many banking and financial products and services such as retail financial services, payment methods, investment management and consulting, insurance products, and credit provision. , is not only competing with traditional banking and financial services but also promoting the innovation and transformation of commercial banks in service delivery and deployment (An and Rau 2019; Di, Yuan, Zeng 2020; Gai, Qiu, and Sun 2018; Millian, Spinola, and Carvalho 2019; Panos and Wilson 2020). The development and application of new technologies such as Big data, blockchain, eKYC, cloud computing, etc. will help banks collect data, improve service quality, reduce technical infrastructure costs, and reduce networks. branch network, enhancing transparency, but still ensuring safety, speed and efficiency, increasing customer satisfaction (Pham Quang Dung et al., 2022). This is an opportunity and a tool for commercial banks to seize to help improve operational efficiency (Románova & Kudinska, 2016).

Besides the great benefits for customers in improving customer experience, the trend of digitizing banking services also creates great risks and challenges. The trend of digitizing banking services also promotes the participation of financial technology companies (Fintech) and big technology companies (Bigtech) in the banking service market. With the advantage of technology and a large customer base, these companies are expected to change the overall picture of competition in the banking and financial services market in the near future. This may cause traditional banks to also be willing to take on greater risks in their operations to compete, increasing the risk in the market. The trend of digitizing banking activities also increases non-financial risks, such as risks of technology crime, risks with outsourced technology service

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providers or risks related to over-dependence. dependent on technology in performing activities (Minh and Duc Anh, 2022).

In this study, the authors assess the impact of the development of Fintech on the operation of commercial banks in Vietnam. Specifically, the authors assess the impact of the development of Fintech, through the interest in financial technology from society, on the profitability of Vietnamese commercial banks from 2014 to 2022. Although There have been some studies evaluating the relationship between Fintech and the operation of Vietnamese commercial banks (for example, Hong and Tuan, 2021; Yen et al., 2022), but to the knowledge of the authors, this is The first study evaluates the impact of Fintech on the operation of Vietnamese commercial banks based on the level of public interest in Vietnam in Fintech.

## **2. STUDY OVERVIEW**

The term ‘‘Fintech’’ is a shortened form of the words ‘‘Financial technology’’ or ‘‘finance’’ and ‘‘technology’’, a general description of the interconnection of modern internet technology (e.g. electricity) cloud computing, mobile Internet) with the business activities of financial service providers (e.g. credit services, banking transactions) (Gomber et al., 2017). Thereby contributing to the provision of new and improved financial services, delivering outstanding efficiency and better satisfying customer needs (Thakor, 2020).

A research group shows that Fintech has a positive impact on the operation of commercial banks, improving the operation of commercial banks through the application of new technologies in service provision, assessing risks and advantages from information, big data collected from customers. (Fuster et al., 2019, Goldstein et al., 2019, Berger et al., 2019). Similarly, Wonglimpiyarat (2017) and Navaretti et al (2017) also believe that the application of technological advances will help traditional products and services of commercial banks become more efficient and competitive. Yen et al (2022) argue that Fintech applications help commercial banks reduce costs by taking advantage of data sources from customers through technology applications to analyze customers’ habits and behaviors. , thereby reducing marketing costs and improving profitability from improving the efficiency of cross-selling products. Fintech solutions also help create banking and financial products and services that are more diversified and tailored to the needs of customers, improving access to financial services, thereby helping businesses Commercial banks expand their customer base (Gomber et al., 2017). Hou et al. (2016), Cheng and Qu (2020), Lee et al. (2021), and Wang et al. (2021b) argues that Fintech helps commercial banks improve efficiency in risk management and cost management. Therefore, Jason Yeh (2016) believes that the development of FinTech can bring about compensating, symbiotic effects and improve the profitability of traditional commercial banks.

In addition, some studies show that the development of Fintech has a negative impact on the operation of commercial banks, especially the competition of Fintech companies. Disruptive innovation theory indicates that competitors with technological and innovative advantages in the market will increase the level of competition in the market (Christensen, 2013), creating creating new profitable value chains and directly impacting existing businesses in the market that are offering similar products with less technological and innovative value than Anagnostopoulos, 2018). Buchak et al. (2018) and Thakor (2020) argue that the development of Fintech increases the level of competition and makes the operation of commercial banks become unstable when the level of risk acceptance increases. In fact, Li et al. (2020) indicates that Fintech companies can provide traditional banking products and services with lower costs and higher efficiency thanks to technological advantages. Paulet and Mavoori

(2019) argue that Fintech companies have a competitive advantage over commercial banks thanks to innovative and effective products for customers, while the requirements for management and capital adequacy are much lower than those of commercial banks. NHMs. Guo and Shen (2016), Wang et al. (2021), and Zhao et al. (2022) provides empirical evidence that the development of Fintech causes the asset quality of commercial banks to decline, increasing credit risk because commercial banks accept a higher level of risk to compete with other banks. Fintech company. Similarly, Phan et al (2020) study in the Indonesian market and show that the strong growth of fintech companies has a negative effect on the efficiency of the business operations of the companies. NHM. Similarly, Zhao et al (2021) analyzed the relationship between Fintech application and efficiency in the operation of commercial banks in China and found a negative relationship of Fintech to the profitability of commercial banks. In addition to the negative impact of competition, Nguyen Hong Nga (2020) commented that commercial banks also have to deal with new risks such as strategic risks, outsourcing risks or cybersecurity risks, technical risks, etc. techniques from the application of Fintech, which without appropriate management solutions will negatively affect the operation of commercial banks.

In this study, the authors evaluate the impact of the development of Fintech, through the level of public interest in Fintech on the operation of commercial banks in Vietnam, which is reflected in profitability. The research for the Vietnamese market comes from two reasons. Firstly, Fintech in Vietnam has developed strongly recently. According to the Fintech in ASEAN report 2021 by UOB, PwC Singapore and Singapore Fintech Association (SFA), Vietnam-based Fintech companies have raised more than US\$388 million in investment capital, equivalent to 9% of the total. The value of 167 investments in Fintech in the ASEAN region in the first nine months of 2021, put Vietnam in third place in terms of successful capital raising, creating a strong recovery compared to 2020. Enterprises Fintech in Vietnam has great potential for development, competing with commercial banks with a strong retail market (Pham Quang Dung et al., 2022). However, like businesses in the world, Fintech enterprises have not had the experience and have not built a brand name to expand their operation scale, which leads to the challenge of independent operation of the company. with most businesses (Vu Cam Nhung and Lai Cao Mai Phuong, 2021). Therefore, many Fintech companies have been cooperating with reputable and experienced commercial banks in order to perfect their business plans into reality (Kieu Huu Thien, 2022). Second, although some previous studies have evaluated the relationship of Fintech and the operation of commercial banks in Vietnam such as the study of MSc. Luu Anh Nguyet (2017); Dr. Dinh Thi Thu Hong and Dr. Nguyen Huu Tuan. However, similar to other studies in the world, Fintech development is often approached from the supply side, only from the supply side, through the number of Fintech companies and the amount of investment capital and companies. Fintech companies (eg, Li et al., 2017; Phan et al., 2019, Zhao et al., 2022). However, the use of this indicator to assess the development level of Fintech only stops at assessing the impact of competition from Fintech companies on the operation of commercial banks, instead of assessing Overall, the impact of Fintech in general, from within the application of Fintech by commercial banks as well as the level of Fintech usage by the community (Wang et al., 2020). In this study, the authors assess the level of development of Fintech through the level of information search about Fintech in Vietnam. In the context of the technology boom, the level of information search can help assess the popularity and interest of the community about Fintech, which can then be used to assess the level of development of Fintech in a country. (Askatas and Zimmermann 2009, Wang et al., 2020).

### 3. RESEARCH METHOD

#### 3.1. Research models

Expected regression model to use:

$$ROE_{i,t} = \beta_0 + \beta_1 FIN_t + \beta_2 LnSIZE_{i,t-1} + \beta_3 LIQ_{i,t-1} + \beta_4 CRR_{i,t-1} + \beta_5 LEV_{i,t-1} + \beta_6 NII_{i,t-1} + u_i + e_{i,t}$$

$$ROA_{i,t} = \beta_0 + \beta_1 FIN_t + \beta_2 LnSIZE_{i,t-1} + \beta_3 LIQ_{i,t-1} + \beta_4 CRR_{i,t-1} + \beta_5 LEV_{i,t-1} + \beta_6 NII_{i,t-1} + u_i + e_{i,t}$$

Where,  $i$  is the bank index, and  $t$  is the time index.  $u_i$  is a fixed variable over time to control for the effects of the economy on credit activities in general of commercial banks that have not been shown through individual explanatory variables of each commercial bank and  $e_{i,t}$  is the residual of the regression model. Similar to Kim and Sohn (2017) and Vinh (2018) the explanatory variables were included in the model with a one-stage lag to exclude potential endogenous effects.

The bank's profitability is expressed through two variables, ROE and ROA, the higher these variables are, the greater the profitability of this bank.

$FIN_t$  is the variable representing the development of Fintech in the time period ( $t$ ), is also the variable of most interest in the study. In this study, the group used the level of search on Google with the keyword "Fintech" in Vietnam from January 2014 to the end of December 2022, according to statistics from the Google Trend application. Google Trends statistics the number of public Google searches related to a given keyword with geospatial and time constraints via relative search volume (RSV). Many studies have used RSV to measure public interest in a given topic. Malkiel (2003) & Fama and MacBeth (1973) when studying the theory of efficient markets, said that the stock market is affected by any transparent information. Subsequent researchers such as (Wang, Keswani, & Taylor, 2006) also used these factors to build the investor sentiment index on the Brazilian stock market and the results were similar to the previous author's research. . Ho and Hung (2009) also contributed to empirical research, using the hypothesis of Barker and Wurgler to build a set of indicators to measure market sentiment to test the relationship between market sentiment and profitability of stocks.

To control for the characteristics of commercial banks that can affect profitability, the research team includes a number of control variables in the model as follows.

The first is the bank's size variable ( $LnSIZE_{i,t-1}$ ), which is calculated through the logarithm of the value of total assets. The theory of economies of scale and scope says that large banks have an advantage of size over small banks so they are able to earn more money, and the increase in size allows banks to large increase in bank earnings (Berger et al., 1987; Berger and Humphrey, 1997; Fu and Heffernan, 2008). However, small banks can also rely on small investments on a large scale, and economies of scale do not offset all the losses in the absence of economies of scale and thus , financial performance cannot be improved (Miller and Noulas, 1997).

Next is the variable reflecting the liquidity of commercial banks ( $LIQ_{i,t-1}$ ). Measured by the percentage of highly liquid assets to total assets of commercial banks. Basically, holding too large of liquid assets can allow commercial banks to reduce liquidity (Cornett et al., 2011), but it can also cause commercial banks' loss of profitability. Liquidity has a significant contribution to determining the existence and sustainable

development of entities. With the financial intermediary function, commercial banks always consider and consider liquidity as one of the important goals when making decisions. Diamond and Dybvig (1983) argue that liquidity assurance is necessary to avoid liquidity risks for commercial banks. According to Keynes Liquidity Preference Theory, holding money is not for profit and if you want to make a profit, you must make an investment, such as buying trading securities. Money is the most liquid asset element, so holding a lot of money will be beneficial to increase liquidity, but lose the opportunity to make a profit and therefore, any entity must accept the trade-off between liquidity target and profit target. If you want to achieve high profits, you must reduce liquid assets to invest in less liquid assets, and vice versa.

The explanatory variable representing credit risk in the operation of commercial banks, CRR, is calculated as the bad debt ratio in the credit portfolio of commercial banks. Credit activities still play the most important role in the business activities of Vietnamese commercial banks, so a high credit risk ratio will have a direct impact on the profitability of commercial banks. A higher level of bad debt indicates the existence of financial constraints and the impact on bank management and regulators. NPLs also significantly affect the bank's functions through the weakening of bank assets and the decline in income as uncollectible debts become larger. In a worst-case scenario, a high NPL ratio in the banking system may indicate the existence of systemic risk, which in turn can affect deposits and limit the activities of financial intermediaries. the result will be negative impact on investment and economic growth (Ahmed et al., 2006). Bank performance is often related to the risk-taking behavior of bank managers (Hu et al., 2004; Jimenez and Saurina, 2006; Boudriga et al., 2009; Nikolaidou and others). Vogiazas, 2011).

The variable LEV is calculated as the financial leverage ratio of each commercial bank. Expressed by the ratio of total debt to working capital. High financial leverage will increase pressure on interest payments and thereby reduce the rate of return on total assets, increasing the pressure to reduce bankruptcy at commercial banks.

The variable NII, calculated by the proportion of non-interest income to total income, reflects the diversity of income of each commercial bank. Expanding non-interest service activities helps commercial banks increase sales and income. The banking industry has been facing new banking environment challenges due to increased competition, forcing the industry to adopt a diversification strategy (Hunjra et al., 2020). Well-diversified banks will disperse risks (Hoang Ngoc Tuyen & Vo Thi Hien, 2010). In fact, all over the world, commercial banks have turned to increase their revenue from service business.

To limit the problem of additional variables in the model, the research team used the control variables one period later than the return variable and the variable expressing the public's interest to the public financial technology.

## **3.2. Research data**

### **3.2.1. Data**

The study uses panel data collected from 21 commercial banks in Vietnam with data from quarterly published financial statements of commercial banks from the database of CafeF website. . The team built data on the Fintech development index in Vietnam based on the online search platform Google Trends - a platform that shows the search level of keywords in a range of Vietnam with the keyword "Fintech". Although data from Fintech Enterprises has been available since 2008, but after 2008 and 2009, the growth of Fintech in Vietnam as well as in Asia in particular and globally in general is still extremely low (Cheng et al. associates, 2020). Therefore, in order to limit the status of data and incorrect information, the research

team has collected data since 2014 in order to have more accurate analysis results.

**3.2.2. Descriptive statistics of data sets**

**Table 1: Descriptive statistics of variables used in the model**

Variable	Observed	Mean	Standard Deviation	Minimum Value	Maximum Value
ROA	675	0.003347	0.002602	-0.005450	0.012502
ROE	675	0.040521	0.027312	-0.062408	0.169424
FIN	675	3.221370	1.386067	0	4.503900
LnSIZE	675	12.21497	1.042759	10.01697	14.56718
LIQ	675	0.147573	0.082604	0.034255	1.175210
CRR	675	0.013607	0.004643	6.83E-06	0.033096
LEV	675	0.083825	0.025970	0.030629	0.175878
NII	675	0.075479	0.054494	-0.003239	0.463102

*Source: Calculations of the research team*

Table 1 shows descriptive statistics of the variables used in the article, that is, number of observations, mean (Mean), standard deviation (Std. Dev.), minimum value (Min). and the maximum value (Max). From the results of Table 1 it is shown that there are 675 observations, 0.3347% and 4.0521% are the mean values of ROA and ROE, the max and min values of ROA are 1,2502% and -0.5450% respectively, the max and min of ROE are 16,9424% and -6,2408% respectively, which are relatively low figures. As for the independent variables, FIN was collected by the authors from the online search engine Google Trends - allowing users to see how often specific keywords, topics, and phrases have been queried over a period of time. certain. The frequency of FIN searches or the level of public interest in Fintech with the maximum and minimum values is 4.503900 and 0, respectively, the mean value of 3.221370 is quite high, and the standard deviation between the study periods is 1.3866067.

The average size of commercial banks is 12,21497, the difference between commercial banks is also quite large at 1,042759, while the largest commercial bank is 14,56718, the smallest one is 10,01697. The liquidity ratio has a mean of 0.147573, standard deviation of 0.082604. The average bad debt ratio of commercial banks is 1,3607% and the commercial bank with the largest bad debt ratio is at 3,3096%. The average leverage ratio is 0.083825, standard deviation is 2,5970%. The ratio of non-interest income is assessed to be quite low when the mean is 7,5479%, the standard deviation is 5,4494%, in which the non-interest income ratio of commercial banks is the highest at 46,3102% compared to the total assets of the bank.

**4. RESULTS AND DISCUSSION**

**4.1. Results**

Before performing the graph analysis, the authors checked the multicollinearity between each variable in the article and described the correlation coefficients of each variable with high correlation coefficient that affects the accuracy. of the results. The degree of association between variables is greater when the correlation coefficient is close to 1 or -1. Besides, the association will be considered balanced if the absolute value of the correlation coefficient is greater than 0.8. The results in Table 2 have shown that there is no serious disconnection between the variables measuring the absolute value of each coefficient being less than 0.8 and hence no multicollinearity in this model.



**Table 2: Correlation between variables used in the model**

	FIN	LnSIZE	LIQ	CRR	LEV	NII
FIN	1.0000					
LnSIZE	0.152274	1.0000				
LIQ	0.129388	-0.071269	1.0000			
CRR	-0.113254	0.426749	0.066966	1.0000		
LEV	-0.038908	-0.343455	-0.006443	-0.079549	1.0000	
NII	0.204328	0.511087	-0.015380	0.258290	0.211152	1.0000

Source: Calculations of the research team

Regression results with panel data series with dependent variable ROE of 21 commercial banks operating in Vietnam are shown in the following table:

**Table 3: Regression results with dependent variable ROE**

ROE	FEM	REM	POLS
FIN	0.002579** [0.001040]	0.004019* [0.000822]	0.004657* [0.000727]
LnSIZE	0.021185* [0.004103]	0.014219* [0.002825]	0.002456* [0.000414]
LIQ	-0.002178*** [0.011245]	0.004991*** [0.010778]	0.006349*** [0.011003]
CRR	-0.710219* [0.212156]	-0.682453* [0.210387]	-0.326808*** [0.225026]
LEV	-0.140351 [0.050531]	-0.108025** [0.047850]	-0.165997* [0.031922]
NII	0.066355* [0.025115]	0.079634* [0.04272]	0.178164* [0.018303]
cont	-0.209236* [0.045532]	-0.1337735* [0.031911]	-0.074333* [0.016387]

Source: Calculations of the research team

At the same time, the group also used the Hausman test to show the model and found that the REM model was more effective.

**Table 4: Hausman test**

Test summary	Chi-Sq. Statistic	Chi-Sq. d. f.	Prob.
Cross-section random	6.292549	6	0.3912

Source: Calculations of the research team

Next, the group performed the regression model with the dependent variable as ROA and performed the Hausman test to get the result that the more effective model is still the REF model.

**Table 5: Results of the regression model of the dependent variable ROA**

ROA	FEM	REM	POLS
FIN	0.000175** [8.85E-05]	0.000340* [7.11E-05]	0.000416* [6.51E-05]

LnSIZE	0.002306* [0.000349]	0.001512* [0.000248]	-3.28E-05*** [3.71E-05]
LIQ	0.000592** [0.000956]	0.001367*** [0.000920]	0.000736*** [0.000986]
CRR	-0.080634* [0.018044]	-0.078545* [0.017911]	-0.017056* [0.020160]
LEV	0.024983* [0.004264]	0.028363* [0.004087]	0.017056* [0.002860]
NII	0.008121* [0.002136]	0.009538* [0.002071]	0.022408* [0.001640]
cont	-0.027014* [0.003873]	-0.018346* [0.002796]	-0.010354* [0.001435]

Source: Calculations of the research team

**Table 6: Hausman test**

Test summary	Chi-Sq. Statistic	Chi-Sq. d. f.	Prob.
Cross-section random	11.156487	6	0.0837

Source: Calculations of the research team

**Note:** The symbols \*,\*\*,\*\*\* correspond to p-values less than 1%, less than 5% and greater than 5%.

#### 4.2. Discussion

From the research results, it can be seen that the independent variable Fintech indicates the level and frequency of public search and access to Fintech, which has a positive relationship with the bank’s performance. Aylin and Ahmet (2020), stated that the fact that banks can effectively manage risks, make decisions quickly and accurately, and can improve customer service quality is partly supported by Fintech. In addition, Lucey and Roubaud (2020), stated that customers can reduce borrowing costs, customers can get loans easily, and the operational efficiency of banking services can be improved through getting loans. Fintech support. According to Petralia et al (2019), the rise of Fintech has had a great impact on the traditional business of commercial banks. According to Hoang Duc Sinh et al, the development of Fintech has increased profits, led to innovations and improved risk control for commercial banks.

Banks react differently to emerging challenges in the market, but an increasing number of banks have started collaborating with FinTech startups and scaling in recent years (Horváth 2019). Through cooperation with FinTech, banks can react faster to emerging market changes and be more efficient in developing products and services (Salampasis – Mention 2017; Paleckova 2019). Scott et al (2017) show that the adoption of digital innovations can have a large and lasting positive impact on the performance of banks. Banks may also face challenges in implementing new developments due to their legacy systems. FinTech startups and scalers provide banks with new skills, languages and solutions to meet customer needs and not be hindered by legacy systems (Boratynska 2019).

FinTech can directly connect with potential users via social networks, allowing them to continuously assess customer needs and incorporate feedback into new developments (Anagnostopoulos 2018). Startups are also often less geographically focused. They mainly provide internet-based solutions, so their target market is not limited to one country or region. As a result, they can offer standardized products or services worldwide at little or no extra cost. Partnering with them allows banks to expand their target market

(Romanova – Kudinska 2017). Thus, partnering with FinTech enables banks to innovate value propositions or entire business models through innovative financial technologies, delivering benefits including improved performance and competitiveness. (Zott – Amit 2007; Poetz et al 2015; Salampasis – Mention 2017).

The benefits aren't just for the bank. There is mutual learning potential for both sides, because banks have expertise in financial risk management, retail and corporate lending, while FinTech has innovative ideas in technology (Romanova) – Kudinska 2017). Acquiring customers can also be difficult and expensive, but partnering with banks allows FinTech to reach a large number of existing customers (Dapp 2015; Hill 2018). They can also benefit from banks' access to the global payment system (Chishti – Barberis 2016). Finally, banks have a richer resource base (e.g. capital, people), so they can more easily initiate larger scale projects, while providing investment opportunities and profits. additional benefits during the cooperation period (Bunea et al. 2016; Haddad – Hornuf 2019).

The results also show the impact of the bank's endogenous factors on profitability.

First, the size of the bank has a positive impact on the performance of commercial banks. This is consistent with the research results of Craigwell and Maxwell (2005), banks with large scale will be able to make better use of advantages in terms of marketing conditions as well as economic conditions. In the middle market segment, small banks do not have high performance, this is the opinion of two research groups Macedo and Barbosa (2009); Périco et al (2016) jointly proposed.

Second, liquidity has a positive relationship with bank performance, specifically, the regression coefficient of liquidity with ROE is 0.00499 with significance level above 5%. The efficiency of the fund will be reduced when a commercial bank uses too much idle capital to lend because it has to reduce provisions and payment capacity to increase loan balance. An increase in outstanding loans is one of the factors that help the bank increase interest income, but the decrease in funds is one of the factors that make the bank face higher liquidity risk. The above results are consistent with the research results of Kosmudou (2008) and Brouke (1989).

Third, credit risk has a coefficient of less than zero when running the model with both ROE and ROA variables. It is obvious that the cost of credit provision increases as credit risk increases. When the cost of credit provision increases, profits will decrease, leading to a decrease in ROA. The results of the model are consistent with the business practice of each commercial bank. This result is consistent with the research results of Halil (2012) and Suflan (2009).

Fourth, the regression coefficient of capital adequacy ratio is negative for the dependent variable ROE but positive for the dependent variable ROA. This result is consistent with the study results of Buyukslvarcil and Abdioglu, 2011; Bateni et al., 2014. This relationship means that when a bank's profit increases, it will reduce the bank's minimum capital adequacy ratio, because when the bank wants to achieve more profits, the bank must accept portfolio expansion or choose a portfolio with more risk.

Fifth, non-interest income has a negative impact on profitability indicators (ROE, ROA). With the corresponding coefficient of variation is 0.079634 (significant level less than 1%) with ROE and 0.009538 (statistical significance level less than 1%). Obviously, as non-interest income (including interest income from non-credit services) increases, so will the bank's net return on total assets. The research results of Angela Roman (2013) and Alper & Anbar (2011) are consistent with the above results of the research group. Angela Roma (2013) studied in the period 2003 -2011, what factors affect the profitability of commercial banks in Romania. The results of the study show that non-interest income and loan balance have a negative effect on the ratio of net profit to total assets, but ROA is not affected by interest expenses.

## 5. CONCLUSION

This study aims to systematize the theoretical basis of financial technology (Fintech) and profitability of commercial banks, thereby measuring the impact of Fintech on the profitability of banks. trade in Vietnam, and propose solutions to improve the efficiency of Fintech application in promoting the profitability of the Vietnamese banking system in the future.

Based on the results of the model, the team draws the conclusion that financial technology (Fintech) has a positive impact on the profitability of Vietnamese commercial banks. When this technology is applied and developed in the business activities of commercial banks, the profitability of commercial banks will be improved.

## 6. RECOMMENDATION

The development of Fintech companies negatively affects the performance of commercial banks when the number of these companies in the market is increasing. Therefore, in order to take advantage of opportunities and solve challenges from Fintech, Vietnamese commercial banks need to carefully consider the application and development of financial technology. At the same time, in order to limit the bad effects of Industry 4.0 and Fintech in Vietnam's banking and financial sector, it is necessary to pay attention to the following issues: (1) strengthen cooperation between commercial banks and companies. Fintech for sustainable development of Vietnam's banking system; (2) carefully consider the application and development of financial technology to ensure the profitability of commercial banks; (3) strictly manage the activities of Fintech companies in the market to minimize negative impacts on the performance of commercial banks.

Along with that, it is also necessary to make appropriate solutions and recommendations for participants such as the Government and regulatory agencies, financial - banking institutions (financial intermediaries, commercial banks). ...), other participants.

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## RESEARCH ON THE IMPACT OF DIGITAL BANKING SERVICE QUALITY ON CUSTOMER SATISFACTION AT JOINT STOCK COMMERCIAL BANK FOR FOREIGN TRADE OF VIETNAM (VIETCOMBANK)

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*ABSTRACT: This article aims to determine the factors affecting the quality of digital banking services and the impact of digital banking service quality on customer satisfaction. The study was conducted based on a survey of 218 customers in Vietnam who used or have been using Vietcombank's digital banking services. Through the analysis process, the research has determined that there are five factors that directly affect the quality of digital banking services including: Efficiency and ease of use, Reliability, Security, Response time and Design. The results also show that the quality of digital banking services has an influence on customer satisfaction. In addition, when studying the effects of demographic variables age and sex, the results show that there is a difference in customer satisfaction at different ages. This will help the bank have policies and strategies to complete the service in the near future.*

**Keywords:** digital banking, service quality, customer satisfaction

### 1. INTRODUCTION

The 21st century - the century of dramatical development of technology, so the global economy is also gradually changing to match the industrial revolution 4.0. The rapid technological development has brought benefits and development potential for most industries, and the banking industry is no exception. The integration of technologies into banking products has become a key factor in the success of a bank. The efficiency of banking operations has been improved thanks to the outstanding development of technology and the internet which make banking operations more convenient, faster, and more efficient. Successfully building a digital bank will help the bank create for itself great competitive advantages and easily participate in international integration. Therefore, promoting digital banking is the main and inevitable trend in the coming time.

Digital banking is becoming a staple of banks because it meets most of the needs of customers who want to use electronic devices to make transactions. At the moment, each bank has built and designed its own digital banking service, so the competition from banks is extremely great. The success or failure of the product will mainly come from user feedback. Only products that can satisfy the demands of customers can continue to exist and develop. On the contrary, products that cannot create customer satisfaction could not survive. Therefore, in order to achieve a high position in the field of digital banking, banks need to pay attention to stimulating the intention and satisfaction of customers when using the service and the key to doing this is improve the quality of their services. That is to improve the quality of their services. From there, we can clearly see the important role of providing quality and appropriate services to improve customer satisfaction, this is the best way for customers to stick with the business for a long time. In addition, it also helps the bank create a reputation to attract and expand the portfolio of customers... Therefore, it is

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important to have studies and surveys on customer satisfaction and needs to be done continuously to Banks have the right direction for themselves. With the goal of becoming a member of the largest banks in Asia, they also consider this a top important activity in the bank’s development plan in the coming years.

Stemming from the necessity and importance of the above problem, the research team decided to choose the topic “Research on the impact of digital banking service quality on customer satisfaction at Joint stock Commercial bank for Foreign Trade of Vietnam (Vietcombank)” for research.

## 2. THEORETICAL FRAMEWORK

### 2.1. Digital banking

#### 2.1.1. General overview of digital banking

Digital banking is a form of banking that digitizes all traditional banking activities and services Gaurav Sarma (2017). Accordingly, all banking transactions can be performed anytime, anywhere via the Internet through forms such as 3G/4G/Wifi.

Vietnam is in the early stages of digital transformation and many banks have started implementing digital banking services. Most banks in Vietnam have a digital strategy and digital banking development orientation. Banks all think that digital transformation is extremely important, so up to 96% of banks have been building a development strategy based on 4.0 technology, 92% of banks have developed Internet services and mobile applications.

Most Vietnamese banks have been implementing digital transformation strategies, setting up their own digital banking departments to focus on researching and implementing digital transformation. For example, Nam A Bank (Nam A Commercial Joint Stock Bank) launched a digital transaction space integrating a modern device ecosystem, artificial intelligence application, OPBA robot and the birth of the VTM OPBA digital branch. Another example is Orient Commercial Joint Stock Bank (OCB) established OCB OMNI channel. As a result, digital transaction channels are connected and unified for customers to experience fully, helping customers to use products and services without going to a transaction office...

In addition, banks are implementing cooperation models with technology companies or large technology companies in the financial sector. This partnership brings customers more exciting experiences and diverse services.

Digital banking is growing strongly and has brought many specific benefits to customers such as: convenient transaction, time saving, cost saving, high accuracy, high security.

#### 2.1.2. Compare digital banking and e-banking

Criterion	Digital banking	E-banking
Notion	A form of banking that digitizes all activities and services of a traditional bank.	An online banking service, the bank’s electronic banking, allowing users to look up information and make online transactions.
Nature	Digital banking is broader and more comprehensive than electronic banking.	Reflecting only a part of the application of digitization in the banking sector, it is not required to integrate digitalization for the entire operation of the bank.
Feature	Digital banking has all the features of a real bank, such as: loan, consumer loan, withdrawal, money transfer, account management, investment, insurance,...	E-banking is just a service created to supplement the services of traditional banks, focusing on basic features: money transfer, payment, balance lookup, savings deposit, etc. ..

## **2.2. Service quality and satisfaction**

### **2.2.1. Service quality**

Service quality is the degree of satisfaction with which a service meets the needs and expectations of customers (Lewis and Mitchell, 1990; Asubonteng et al., 1996; Wisniewski and Donnelly, 1996). Edvardsson, Thomsson and Ovretveit (1994) argue that service quality is a service that meets customers' expectations and satisfies their needs. According to Parasuraman et al (1985, 1988), service quality is the gap between customers' expectations and their perception when using the service. Thus, although there are many different definitions, in general, service quality will be evaluated based on the perception of customers.

Research by Parasuraman et al (1988, 1991) is the research that has received much attention when studying service quality. Parasuraman et al. have proposed a model of five gaps and five components of service quality, called SERVQUAL for short. After reviewing and testing the model, the author has proposed 5 basic components that need the most attention when considering service quality, including: Reliability, Responsiveness, Assurance, Empathy and Tangible.

### **2.2.2. Satisfaction**

According to Philip Kotler (2000), "Satisfaction is a person's feeling of satisfaction or disappointment as a result of comparing the actual received product (or outcome) in relation to their expectations". Hoyer and MacInnis (2001) again stated that "Satisfaction can be associated with feelings of acceptance, happiness, helpful, excitement, joy". According to Hansemark and Albinsson (2004), "Customer satisfaction is a customer's overall attitude towards a service provider, or an emotional response to the difference between what the customer expects before and what they receive, for the fulfillment of some need, goal or desire". Thus, it can be understood simply that customer satisfaction is the feeling of customers after using the supplier's products and services and comparing reality with expectations. .

According to Bernd Strauss and Patricia Neuhaus (1997), satisfaction is divided into three categories: active satisfaction, stable satisfaction, and passive satisfaction.

### **2.2.3. The relationship between service quality and customer satisfaction**

If a business wants to survive and develop, they always need to go the extra mile. Therefore, constantly improving service quality to meet customer needs is a good way to succeed in the market. With good service quality, customers will be satisfied, that satisfaction will lead to loyalty and increase the bank's competitiveness in the market. According to Agyapong (2011), customer satisfaction and service quality have a positive relationship. This study shows that good service quality is synonymous with customer satisfaction. From there, the bank can see that identifying and meeting customer needs is the way to improve service and differentiate from competitors.

The financial services industry operates on the trust of consumers, quality is a matter of concern and greatly affects business results. Profits and business growth are mainly guaranteed by customer loyalty (Belas and Gabcova, 2014), which in turn is built from satisfaction with service. Therefore, customer satisfaction is the key factor to bring the relationship of businesses and customers further, longer and more cohesive. Thus, service quality is an important factor determining the satisfaction of commercial bank customers..

## **3. RESEARCH METHOD VÀ MODEL**

### **3.1. Research method**

The study used quantitative research method. Formal quantitative research is based on the calculation of Bolen (1989), the total number of parameters included in the model is 28 , so the sample size needs to be 140 (ratio 5:1). Therefore, the research team made the distribution of 250 votes. Survey subjects are



individual customers in Vietnam who have or are using Vietcombank digital banking services. The study was conducted from January 1, 2023 to May 2023

The scale chosen is based on previous studies. The Likert scale used has 5 levels: strongly disagree, disagree, moderate, agree, and strongly agree.

The authors use SPSS software. The scales were evaluated by Cronbach's alpha coefficient, Exploratory factor analysis (EFA), Pearson Correlation Coefficient, and Linear Regression.

### **3.2. Research model**

#### ***3.2.1. The relationship between efficiency and ease of use and quality of digital banking services***

“The most important factor that causes repeat customers to use the website is ease of use” (Madu and Madu, 2002). “Ease of use is understood as the ease with which users can interact, use and navigate” (Bressolles, 2006). “Many factors such as: site structure, ease of navigation make it easy to use” (Shang, Chen and Shen, 2004). Hammoud et al. (2018) and Sulieman and Warda (2017) stated that “Ease of use has positive effects on customer satisfaction after conducting research and survey”. Not only that, the study of Kayabaşı et al. (2013) also reinforced the correctness of the hypothesis that ease of use positively affects the quality of e-banking services.

According to Lustsik (2004), “The use of electronic services will give bank customers the opportunity to save costs when performing transactions”, “not only by saving money but also by saving time”. (Ho & Ko, 2008). Therefore, efficiency is a factor to consider when observing the relationship with service quality.

Jamil Hammoud (2018) points out that “The efficiency and ease of use of e-banking will help improve service quality and this factor makes the biggest impact”. This result also coincides with the research of Wirtz & Bateson (1995) conducted in other markets, the study shows that a higher level of efficiency will increase customer satisfaction for the E-banking. Therefore, the research hypothesis (H1) is set out as follows:

H1. Efficiency and ease of use have a positive impact on the quality of digital banking services at Vietcombank.

#### ***3.2.2. The relationship between reliability and digital banking service quality***

“The ability to perform exemplary service and on time for the first time is measured by reliability” (Parasuraman, Zeithaml & Berry; 1988, 1985), it is also understood as the ability to meet the promised service. securely and completely reliably. “When participating in transactions, almost all customers want to be assured of safety, completeness, accuracy and error free” (Tuff & Trair, 2021).

“Reliability refers to a company's ability to provide quality information in accordance with timely, accurate, understandable, and relevant criteria, thereby achieving a high level of satisfaction” (Swaid and Wigand, 2007).

“According to customer requirements, banks need to ensure promptness, timeliness, and compliance with commitments made to customers” (Ashraf, 2020). If the above issues cannot be ensured, customers will tend to leave the bank. “Reliability must be built from the first transaction to build trust in customers, this is a factor contributing to the assessment of service quality and has a lot of influence on customer satisfaction” (Pham Thi Kim Yen et al., 2022)

Reliability is a very important part of creating e-banking service quality, which is reflected through the results obtained from the study of Hammoud et al. (2018) and Sulieman and Warda (2017). Therefore, the research hypothesis (H2) is set out as follows:

H2. Reliability has a positive impact on the quality of digital banking services at Vietcombank.

### **3.2.3. The relationship between security and digital banking service quality at Vietcombank**

“The protection of users can avoid potential financial fraud, privacy issues are security issues mentioned” (Bressolles, 2006).

In order for online transactions to be made, website databases often store large amounts of personal information. The lack of face-to-face interaction when using online services further increases the need to be assured of privacy and security in all matters related to customer transactions. Therefore, S.H. HSU (2008) states that “online security is the main concern of customers in deciding whether to conduct an electronic transaction”.

In addition, Madu and Madu (2002) add that “Web-based services provided must be secure and reliable enough to build a sense of credibility and confidence from customers”. Based on that, Jarvenpaa and Todd (1997) consider “The most important feature in establishing e-trust in terms of reducing customers’ worries and worries about transaction information being leaked to the outside world as security. Therefore, when they realize that online privacy is reliable enough to match customers’ expectations, they may be willing to submit their own data and conduct online transactions proactively. and trust”. Therefore, the research hypothesis (H3) is set out as follows:

H3. Confidentiality has a positive impact on the quality of digital banking services at Vietcombank.

### **3.2.4. The relationship between response time and Vietcombank digital banking service quality**

“Regarding the provision of online banking services, the requirements of customers are often high because they place a lot of expectations about the services will be carried out immediately. Any delay in transaction or request processing can frustrate online customers and discourage them from repurchasing, which can lead to negative word-of-mouth and impact customer acquisition. potential customers make decisions” (Le Van Huy et al., 2017).

Therefore, Kim and Stoel (2003) firmly believe that “Fast response time will significantly influence customer satisfaction with online shopping in a positive direction”.

Regarding internet wait times, Weinberg (2000) believes that “Once the homepage loads fast enough and customer requests are thoroughly handled, efforts to achieve customer satisfaction will be successful”.

Therefore, the research hypothesis (H4) is set out as follows:

H4: Response time positively affects the quality of digital banking services at Vietcombank.

### **3.2.5. The relationship between design and Vietcombank digital banking service quality**

“Website design is an aspect that affects the perception of customers and buyers” (Zeithaml et al., 2002) and “website design is understood as providing customers with information in an interesting and have distinctive and attractive website design (Bresselles et al., 2008”).

“Design features represent ease of navigation, and images conveyed to users” (Nguyen Huu Thai Think and Bui Nhat Quang, 2020).

“Elements such as: colors, embedded windows in the screen, graphics, use of images, animations, icons, videos, etc. are issues that the design ethos reflects” (Bressolles, 2006) ).

“To judge the standards of aesthetic appearance on the web, one must question the type, size and clarity of Wemkrueh texts” (Madu and Madu, 2002), as well as for clarity. images, quality and use appropriate images from the website.

In their study, Sulieman and Warda (2017) showed that “service quality is affected by design features and this is also a factor that creates positive impacts on satisfaction”.

From the information above, we can see that the information is arranged, presented visually and attractively is a potential factor to help customers have a good first impression of digital service experience. Therefore, the research hypothesis (H5) is set out as follows:

H5. Design have a positive impact on the quality of digital banking services at Vietcombank

**3.2.6. The relationship between service quality and customer satisfaction**

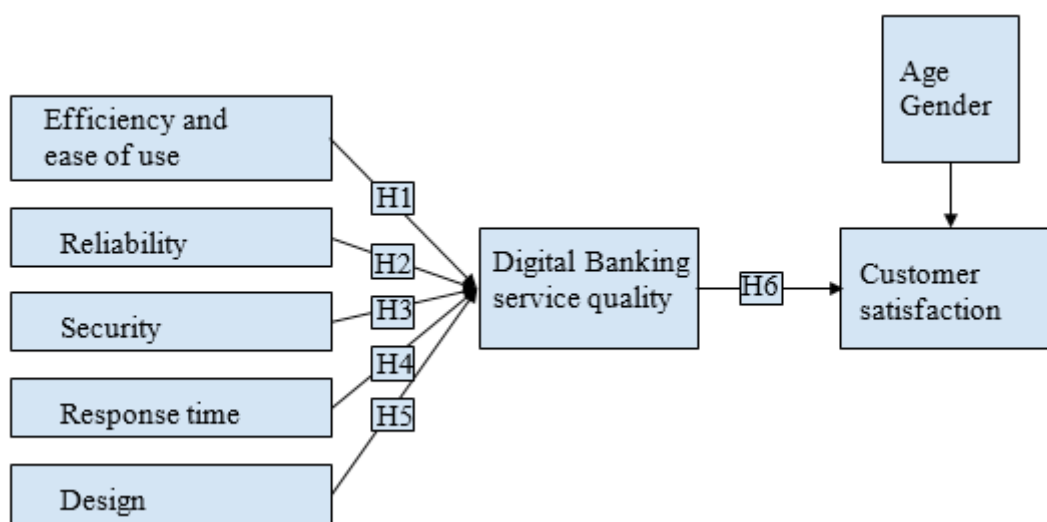
“There is a distinction between service quality and customer satisfaction; while service quality only implies related factors reflecting quality, satisfaction has a broader and more general meaning, influenced by more factors” (Zeithaml and Bitner, 2000).

Cronin and Taylor (1992) showed that “service quality is the bridge to satisfaction”.

Tran Duc Thang (2015) and Kayabaşı et al. (2013) wrote “e-banking service quality positively affects customer satisfaction”. Therefore, the research hypothesis (H6) is:

H6. Digital banking service quality has a positive impact on customer satisfaction using Vietcombank’s banking services.

**Figure 1: Proposed research model**



**4. RESULT AND DISCUSSION**

**4.1. Result**

In general, the reliability coefficient of Cronbach’s Alpha scale is greater than 0.6 and all corrected item-total correlation coefficients are greater than 0.3, these variables will be used for EFA analysis.

**Table 1. Result of Cronbach’s alpha**

Latent Variable	Item Code	Cronbach’s Alpha	Correted Item - Total Correlation	Cronbach’s Alpha if Item Deleted
Efficiency and ease of use	SHQ1	0.781	.612	.724
	SHQ2		.553	.744
	SHQ3		.609	.727
	SHQ4		.613	.714

Reliability	STC1	0.854	.647	.834
	STC2		.714	.806
	STC3		.750	.791
	STC4		.674	.824
Security	BM1	0.844	.712	.847
	BM2		.745	.834
	BM3		.732	.839
	BM4		.734	.838
Response time	TG1	0.814	.573	.794
	TG2		.667	.751
	TG3		.650	.759
	TG4		.649	.760
Design	TK1	0.875	.712	.847
	TK2		.745	.834
	TK3		.732	.839
	TK4		.734	.838
Service quality	CLDV1	0.835	.718	.
	CLDV2		.718	.
Customer satisfaction	SHL1	0.928	.861	.891
	SHL2		.865	.887
	SHL3		.836	.910

Source: Processed from the author's survey data

Exploratory factor analysis EFA for the independent variable was performed 2 times: In the article, the author has 20 observed variables corresponding to 5 measurement components. The article uses the method of factor extraction Principal Component Analysis and Varimax rotation, the results are obtained as follows: variables STC2 and TG3 are excluded from the model because: Variable STC2 uploaded in both factors is Component 1 and Component 3 with the system. load is 0.636 and 0.592 respectively, the difference in load factor is  $0.636 - 0.592 = 0.044 < 0.2$ ; Variable TG3 upload in both factors is Component 3 and Component 6 with load factor of 0.607 and 0.597 respectively, the difference in load factor is  $0.602 - 0.601 = 0.01 < 0.2$ .

The author excluded all bad variables in the 1st EFA analysis. From the 20 observed variables in the first EFA analysis, remove STC2 and TG3 and include the remaining 18 observed variables in the second EFA analysis for the independent variables. Results obtained KMO coefficient =  $0.852 > 0.5$ , sig Barlett's Test =  $0.000 < 0.05$ , so factor analysis is appropriate. The total variance that these 5 factors extracted was  $69.035\% > 50\%$ , thus, the 5 factors extracted explained 69.035% of the data variation of 18 observed variables participating in EFA.

The regression model will have 5 independent variables including: "Efficiency and ease of use" (SHQ), "Reliability" (STC), "Security" (BM), "Response time" (TG), "Design" (TK).

**Table 2. Result of exploratory factor analysis EFA independent variable**

	Component				
	1	2	3	4	5
TK2	.844				

TK1	.838				
TK4	.832				
TK3	.823				
BM3		.845			
BM2		.800			
BM1		.780			
BM4		.678			
SHQ3			.773		
SHQ1			.770		
SHQ4			.729		
SHQ2			.724		
STC3				.806	
STC1				.790	
STC4				.755	
TG2					.793
TG1					.771
TG4					.760

Source: Processed from the author's survey data

Exploratory factor analysis EFA for intermediate variables: KMO result =  $0.5 \geq 0.5$ , sig Bartlett's Test =  $0.000 < 0.05$ , so EFA exploratory factor analysis is appropriate. The factor extracted at eigenvalue is  $1,718 > 1$ . This factor explains 85.890% of the data variation of the two observed variables participating in EFA.

**Table 3. Result of exploratory factor analysis EFA intermediate variable**

	Component
	1
CLDV1	0.927
CLDV2	0.927

Source: Processed from the author's survey data

Exploratory factor analysis EFA for dependent variables: KMO result =  $0.763 \geq 0.5$ , sig Bartlett's Test =  $0.000 < 0.05$ , so EFA exploratory factor analysis is appropriate. The factor extracted at eigenvalue is  $2.626 > 1$ . This factor explains 87.530% of the data variation of the two observed variables participating in EFA.

**Table 4. Result of exploratory factor analysis EFA dependent variable**

	Component
	1
SHL1	0.941
SHL2	0.939
SHL3	0.926

Source: Processed from the author's survey data

Pearson correlation analysis: SHQ, BM, TK, TG, STC with dependent variable of service quality less than 0.05. Thus, there is a linear relationship between the independent variables SHQ, BM, TK, TG, and STC with the dependent variable of service quality. Sig correlation of service quality with SHL is less than 0.05. Thus, there is a linear relationship between the independent variable of service quality and the dependent variable SHL. However, the Pearson correlation assessment cannot accurately confirm the impact relationship between the variables, so we need to conduct regression analysis.

**Table 5. Result of Pearson**

Correlations		SHL	CLDV	SHQ	BM	TK	TG	STC
<b>SHL</b>	Pearson Correlation	1	.695**	.368**	.518**	.469**	.385**	.492**
	Sig.		.000	.000	.000	.000	.000	.000
	N	218	218	218	218	218	218	218
<b>CLDV</b>	Pearson Correlation	.695**	1	.498**	.566**	.360**	.521**	.595**
	Sig.	.000		.000	.000	.000	.000	.000
	N	218	218	218	218	218	218	218
<b>SHQ</b>	Pearson Correlation	.368**	.498**	1	.329**	.163*	.425**	.404**
	Sig.	.000	.000		.000	.016	.000	.000
	N	218	218	218	218	218	218	218
<b>BM</b>	Pearson Correlation	.518**	.566**	.329*	1	.337**	.371**	.488**
	Sig.	.000	.000	.000		.000	.000	.000
	N	218	218	218	218	218	218	218
<b>TK</b>	Pearson Correlation	.469**	.360**	.163**	.337**	1	.190**	.295**
	Sig.	.000	.000	.016	.000		.005	.000
	N	218	218	218	218	218	218	218
<b>TG</b>	Pearson Correlation	.385**	.521**	.425**	.371**	.190**	1	.373**
	Sig.	.000	.000	.000	.000	.005		.000
	N	218	218	218	218	218	218	218
<b>STC</b>	Pearson Correlation	.492**	.595**	.404**	.488**	.295**	.373**	1
	Sig.	.000	.000	.000	.000	.000	.000	
	N	218	218	218	218	218	218	218

Source: Processed from the author's survey data

Regression analysis of 6 independent variables affecting digital banking service quality: R<sup>2</sup> adjusted by 0.548. Thus, the variation of quality service is explained by 54.8% of the variation of 5 independent variables TK, SHQ, BM, TG, STC, the remaining 45.2% is the impact of factors other than the given model and random error.

The results of this table also give Durbin–Watson values to evaluate the phenomenon of first-order series autocorrelation. The value DW = 1.617, “between 1.5 and 2.5, the result does not violate the assumption of first-order series autocorrelation” (Yahua Qiao, 2011).

Standardized regression model:

$$CLDV = 0.281*STC + 0.243*BM + 0.222*TG + 0.190*SHQ + 0.123*TK$$

**Table 6. Regression Coefficients**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	Std. Error	Beta				Tolerance	VIF
(Constant)	.258	.233		1.105	.270		
BM	.221	.050	.243	4.388	.000	.680	1.470

TG	.217	.052	.222	4.185	.000	.741	1.349
STC	.222	.044	.281	5.018	.000	.666	1.501
SHQ	.155	.043	.190	3.586	.000	.742	1.348
TK	.107	.043	.123	2.501	.013	.863	1.159

Source: Processed from the author's survey data

Univariate regression evaluates the impact of digital banking service quality on customer satisfaction: F-test sig value is  $0.000 < 0.05$ , therefore, the regression model is suitable. corrected to 0.48. Thus, the variation of SHL is explained by 48% of the variation of the CLDV variable. The results of this table also give Durbin–Watson values to evaluate the phenomenon of first-order series autocorrelation. The DW value = 1.673, “between 1.5 and 2.5, the result does not violate the assumption of first-order series autocorrelation” (Yahua Qiao, 2011).

The variable CLDV has a sig test t equal to  $0.000 < 0.05$ , so this variable has statistical significance, or affects the dependent variable SHL.

Standardized regression model:  $SHL = 0.695 * CLDV$

**Table 7. Regression Coefficients**

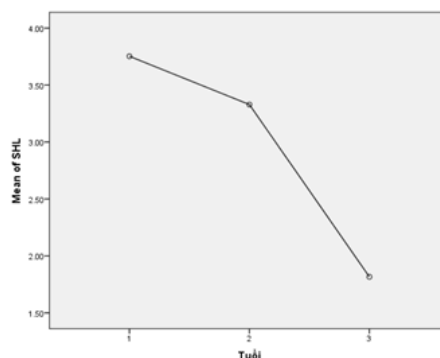
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	Std. Error	Beta				Tolerance	VIF
(Constant)	-1.368	.343		-3.986	.000		
BM	1.259	.089	.695	14.200	.000	1.000	1.000

Source: Processed from the author's survey data

Analyzing the difference between two gender groups in terms of satisfaction when using Vietcombank’s digital banking services, there is no significant difference between the two gender groups. In other words, between two different age groups, there is no evidence that there is a difference in satisfaction.

Analyzing the difference between age groups in terms of satisfaction when using Vietcombank’s digital banking services: Sig test Levene equals  $0.000 < 0.05$ , there is a difference in variance between age groups, we will use the results Welch test results in Robust Tests of Equality of Means table.

Sig Welch test equals  $0.000 < 0.05$ , accepting the hypothesis  $H_0$ , that is, there is a mean difference in SHL between different age groups. Thus, there is a difference in the satisfaction of digital banking services among individuals of different ages.



**Figure 2. Dependence of satisfaction by age**

Source: Processed from the author's survey data

## 4.2. Discussion

The research results show that the quality of digital banking services greatly affects customer satisfaction. In addition, the study also shows that there are 5 factors affecting the quality of digital banking services, including: “Response time”, “Reliability”, “Security”, “Efficiency”. and Ease of Use”, “Design”.

“Reliability” is the factor that has the strongest influence on “quality of digital banking services”. With the coefficient  $\beta=0.281$ , we conclude that “reliability” has a positive impact on “digital banking service quality”. This result is consistent with the research results of Nguyen Van Tien (2021), Sundas et al (2015). These studies also concluded that reliability is considered the most important factor in shaping service quality. In the banking sector, transactions are directly related to the financial problems of customers - something that is always valued and valued by most customers, it is perfectly reasonable to take first place. Because, customers in general do not want to have any problems when making transactions related to their finances. If Vietcombank’s digital bank can build high trust for customers, it will be a good factor to help the bank retain customers and improve its competitive advantage. Thus, whether before, during or after the pandemic, the reliability factor is always highly appreciated. Deploying digital banking in the current post-covid-19 period should pay special attention to creating reliability in Vietcombank’s customers.

Security is the second factor assessed by customers affecting the quality of digital banking services. With the coefficient  $\beta=0.242$ , it can be concluded that “security” has a positive impact on “digital banking service quality”. This result is consistent with the study of author Kayabaşı et al. (2013). This result is perfectly reasonable because, people want that the transaction must be completely secure and all their information is safe. From the results of the survey, it is also clear that customers appreciate the role of security and this is also something that has received special attention until now. Therefore, improving security is an important task that needs attention to improve the quality of digital banking services and help Vietcombank have a good place in the market. Because, after the outbreak of the covid-19 epidemic, the number of people choosing digital banking increased and remained until the current post-covid time, but along with it was an increase in criminals taking advantage of security holes of the bank to profit, causing unpredictable consequences for the bank. In addition, during and after the epidemic, many banks have now deployed digital banking, but security still faces many difficulties. Through all of the above, if Vietcombank can build a good security system, it will not only improve customer satisfaction and maintain the number of current customers, but also can acquire a large number of customers in the future.

Response time is the third factor assessed by customers that affects the quality of digital banking services. With the coefficient  $\beta=0.222$ , it can be concluded that “response time” has a positive impact on the quality of digital banking services. Time to respond to complaints and handle issues will make an important contribution to helping the bank succeed in this technology race. Slow response can also make users frustrated and switch to another digital banking system - which is especially easy in the current digital transformation era, from which banks will gradually lose customers. mine. Therefore, banks need to have strategies to not waste customers’ time in waiting. In addition, the majority of customers who come to and use digital banking services are looking for speed and convenience, so if the response time is slow, the bank has lost an important advantage when it comes to digital banking. develop this new service. This result is consistent with the study of Tran Duc Thang (2015). Thus, after the translation, response time is still a factor of high interest to customers using Vietcombank digital banking services.



Efficiency and ease of use is the fourth factor that customers evaluate affecting the quality of digital banking services. With the coefficient  $\beta=0.190$ , it can be concluded that “efficiency and ease” has a positive impact on the quality of digital banking services. This result is consistent with the study of Hammoud et al (2018). Thus, after the pandemic, efficiency and ease of use are still concerned, however, this is not the top concern of customers using Vietcombank digital banking services. This is because the majority of current customers are familiar with using digital banking, so there are not many obstacles when using it. In addition, this is not a factor that can have much impact on customers’ evaluation of Vietcombank’s digital banking service quality better. Because, currently, most of the digital banking services provided by banks are quite effective and easy to use.

“Design” is the fifth factor assessed by customers that affects the quality of digital banking services. With the coefficient  $\beta=0.123$ , it can be concluded that the design feature has a positive impact on the quality of digital banking services. This result is consistent with the study of Sulieman and Warda (2017). This shows that digital banking interface design is also a factor that customers care about when evaluating service quality. The design of a digital bank also partly reflects the bank’s image, so doing the wrong thing to be creative, attractive, and in line with the bank’s image and customer needs is extremely important. In addition, the design to suit each individual also needs the bank to aim for in the near future. Thus, in the present time, design is also a factor that Vietcombank customers are interested in. Although this is not a factor that has a strong impact on service quality, Vietcombank still needs appropriate attention.

“Digital banking service quality” directly affects the “satisfaction” of customers. This result is consistent with the study of Kayabaşı et al. (2013) and Tran Duc Thang (2015). Cronin and Taylor’s study also tested the relationship between service quality and customer satisfaction, and similar conclusions were drawn. This result is reasonable because customers always have great interest in service quality in general and digital banking services provided by Vietcombank in particular. Customers will feel more satisfied when the service is enhanced in line with their wants and expectations and conversely, when the service is not in line with their needs, the customer will feel less satisfied. The fact shows that this is reasonable, because service quality is related to the process of providing, and after using the service, the customer can make an assessment of the satisfaction.

Research results also show that young people are more satisfied with digital banking services than people of other ages in the study. Because, they easily adapt to modern technology and are always ready to open up and experience new services. Moreover, digital banking was also born and developed with the generation of young people, it has characteristics suitable to the needs, interests and habits of young people. In addition, the research results can also be explained by the fact that older customers often find it difficult to use technology services and have higher standards and expectations for quality than younger people, therefore, they find it difficult to accept technology services. The current situation also shows that using digital banking also carries many risks and when the problem occurs, most of the people of the previous generation will be more negatively affected because they have more accumulated assets. This is an audience that needs time to adapt, choose and trust digital banking services. Therefore, after the Covid-19 epidemic, the number of customers looking for digital banking services increased, but those aged 25 and over still need special attention from Vietcombank to be able to provide the best service.

From the results obtained, the team made some suggestions to help Vietcombank improve the quality of digital banking services, on that basis, improve customer satisfaction using the service:

Firstly, improve customers' trust in Vietcombank digital banking services: The bank needs to provide information quickly and transparently on the digital banking interface and through channels such as newspapers, television, news, messages,...; ensure that all services in digital banking are performed as committed to customers from the beginning and solve arising problems in a timely manner; have policies and rules to handle cases where employees do not comply with their commitments and cause harm to customers using the service.

Secondly, to enhance the security of the digital banking system Vietcombank: Vietcombank needs to maintain compliance with regulations of state agencies on cybersecurity such as: Circular 09/2020/TT-NHNN, Law on Security network, ISO 27001, PCI DSS,...; paying special attention to improving the quality of human resources for information security; regularly update security solutions; Artificial intelligence (AI) applications to enhance security should also be noted and developed by Vietcombank in the near future.

Third, information needs to be responded to in a short time: there is a staff to receive and process customer information requested 24/7, in addition, banks can also use chatbots to respond to requests. simple matter; applying digital technology to voice recognition to recognize the name and age of customers calling the switchboard.

Fourthly, improve the efficiency and ease of use of customers: currently, according to the group's observations, customers using Vietcombank's digital banking services even though they can register online accounts, however, customers still need to go directly to the counter to verify information directly within 6 months. This, according to the research team, will affect the user experience and limit the effectiveness of digital banking. Therefore, Vietcombank needs to come up with effective and convenient policies or ways to authenticate information. Vietcombank can apply video authentication so that customers can identify and upgrade account packages anywhere. Customers will be connected to the bank staff through this video call and provide authentication information. Thus, customers can save time and effort.

Fifth, increase the efficiency of digital banking design: Vietcombank can improve the design of its digital banking services by working towards personalizing the user experience; allowing customers to design their own location of available banking facilities and services accordingly; uses Big Data and AI to analyze consumer habits, usage and automatically categorize individual products.

Sixth, providing a separate financial assistant service for each customer: offering new features such as helping customers manage their personal finances, helping customers have an overview of their monthly spending; Personal financial advice is suitable for each customer's condition, from which customers will make reasonable spending, investment and saving decisions.

Seventh, provide services appropriate to each age of use: For example, young people will like to use convenient, youthful, unique services, older ages will want to be trained. Focusing on quality service and safety, security or loan, savings or investment packages, people over 40 will prioritize ease of use and convenience, they are also more interested in safe savings products.

## **5. CONCLUSION**

Digital banking is a development trend in the new era of banks. The authors' research shows that there are 5 factors affecting the quality of digital banking services, including: Reliability has the strongest influence, followed by Confidentiality; followed by Response Time; followed by Efficiency and Ease of Use and finally Design. In addition, the research results also show that service quality also has an impact on customer satisfaction. However, the scientific research paper still has certain limitations that need to be

overcome. The first is that this study mainly collects samples from individual customers using Vietcombank digital banking services in Hanoi, so the sample diversity is not high, the results may not be completely accurate for all regional fish. In addition, the research sample collected is mainly young people or working people under the age of 40, so the analysis results are more suitable for this audience.

Future research could explore this issue with diversity in age, occupation, income and in other more diverse provinces and cities. In addition, new research can also look at how the factors affecting service quality and satisfaction have changed before, during and after the covid-19 epidemic to be able to see the trend in customer consumption, from there, the bank will make appropriate strategies. Future research can explore more about digital banking for corporate customers.

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## BUILDING MODEL FOR DETECTING FRAUD IN FINANCIAL STATEMENTS OF VIETNAM COMPANY

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*ABSTRACT: To prevent fraud in financial statements, the Ministry of Finance has also issued Auditing Standard No.240 (VSA 240), regulating auditors' responsibilities related to financial statement fraud in the field of accounting and finance. Fraud intentionally falsifies economic and financial information by one or more people on the Board of Directors, employees, or third parties, affecting the financial statements. However, applying these standards in practice still has many difficulties. At the same time, companies listed on the stock market cheat in the preparation of financial statements with a large number in the form of "variation" of business results in the financial statements, which is to increase false revenue, reduce costs to increase profits, or raise profits capital is "negative." In contrast, the size of assets does not increase. The study was conducted on constructing a fraud detection model in financial statements in Vietnam. The results show that the study successfully built three fraud identification models with high accuracy and built a matrix model combined with identifying the most fraudulent financial statements. In contrast, the correct prediction rate of fraudulent companies is still high. At the same time, some suggestions propose to improve the detection and prevention of financial statement fraud, thereby helping investors and information users to have more information about understanding fraudulent financial reporting practices and avoiding the unnecessary risks of making decisions based on incomplete information and containing fraud or manipulation of financial statements by managers' enterprises.*

*Keywords: Fraud, Financial Statements.*

### 1. INTRODUCTION

Fraud is an intentional act committed by one or more persons within the Board of Directors, the Board of Directors, employees, or third parties by deceitful actions to obtain an unfair or illegal advantage.

In the United States, the annual loss caused by fraudulent financial statements estimates at 400 billion USD. Businesses lose about 5-6% of their revenue each year due to fraudulent financial statements.

In recent years, there have been many cases of fraud in Vietnam when preparing financial statements of typical enterprises such as Vien Dong Pharmaceutical Company (in 2011) and, Tay Bac Mineral Investment Joint Stock Company (in 2012), Wood Industry Group (2016).

Fraudulent financial reporting has threatened public confidence in market information. Therefore, the truthfulness and accuracy of financial statements in listed companies are essential for shareholders and investors. On that basis, the research team proposed "Building a fraud detection model on financial statements in Vietnam."

- Several models in the world have been built to identify fraud in companies: Beneish (1999) created the M-score model, the model of Burcu Dikmen and Güray Küçükkocaoğlu (2005) in Turkey Turkey, the Model of Tarjo and Nurul Herawati (2015). There have been many studies on the topic of building fraud detection models of financial statements, but the research mainly focuses on the use of a single model as a measure as well as primarily based on quantified information on the financial statements without paying attention to the influence of many other identifiers.

- Subject: Fraud detection model on financial statements

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- Scope of the study: Companies listed on the stock exchange and research to assess the reality of fraud in financial statements of enterprises in 2019-2022.
- Meaning of the topic: The research is built through surveys, and statistics combined with document research, thereby establishing a general theoretical basis on fraud, pointing out the current state of fraud. Fraud synthesizing techniques beautify the financial statements of listed companies and build fraud identification models.

## 2. THEORETICAL BASIS OF FINANCIAL STATEMENT FRAUD

The research team has presented the concept of financial statement fraud according to VSA 240 and outlined theories to explain fraudulent financial statements: The proxy theory of Jensen & Meckling (1976), the idea of financial statement fraud. Related subjects of Freeman (1984), Fraudulent Triangle Theory by Cressey (1953), and Fraudulent Scale Theory by D.W. Steve Albrecht (1980); present the results of the American Association of Fraud Investigators (ACFE) (1993-2012) on types of fraud in organizations, economic crime and fraud survey in Vietnam in 2018 PwC has realistic data on fraud, clarifying the relationship between fraud and factors inside and outside the company who are likely to cause financial reporting fraud and the extent of their impact. Fraudulent financial statements; clarify the parties' responsibilities in detecting and preventing fraudulent financial statements. At the same time, the research team also presented the work of Beneish (1999), Tan et al. (2014), and Kanapickienė (2015), who synthesize the basic theory of fraud to create a premise to build variables and fraud identification models.

## 3. FRAUDULENT FINANCIAL STATEMENTS IN VIETNAM

In Vietnam, in the past years, a series of fraudulent financial statements were discovered that shocked the market and caused concern to many investors. Many companies listed on the stock exchange have a significant difference between profit after tax and after audit. One of the typical cases of financial reporting fraud in Vietnam must be mentioned in the "mission" of Viet Nhat JVC Medical Joint Stock Company in 2015.

Common tricks used in cheating:

Forgery of revenue: The recording of unrealistic income in the accounting books. Forgery of payment is a common form of fraudulent financial statement preparation.

Recognition of an increase in revenue without accounting estimates

Recording in the wrong accounting year: Recording transactions arising in the bad accounting year is the recording of income/or expense that is not correct at the time of occurring.

**Declare debts and expenses:** Concealing debts and expenses is a way to commit fraud in financial statements to increase the company's profits.

The research team has clarified the adverse effects of financial statement fraud in theory and practice, referring to the main fraud methods of Vietnamese enterprises. Thereby clearly showing the importance of identifying and preventing fraudulent financial statements. It is necessary to have helpful fraud detection tools and effective policies and measures to minimize financial reporting fraud.

## 4. RESEARCH MODEL

The research team used quantitative methods to test the hypothesis: Correlation analysis and multicollinearity test.

The research team used independent variables: AUDREPORT, BIG4, CA/CL, CA/TL, CASH/CA, CASH/CL, CASH/TA, TA/CL, CEO, CFO/CL, CL/TL, EQ/TL, FA/TA, GP/SAL, GP/TA, INV/CS, INV/TA, LEV, OP/GP, REC/REV, NI/TA, NI/EQ, RST, SAL/COST, SAL/CS, SAL/GA, SAL/FA, SAL/TA, WC/TA, and dependent variable FRAUD

#### **4.1. Model 1**

##### **4.1.1. Check the correlation coefficient**

The research team used Eview 8 software to test the correlation analysis between the independent and dependent variables, FRAUD. Variables with little correlation with FRAUD ( $p\text{-value} \geq 0.2$ ) were excluded from the model. The results of the correlation analysis show that most of the independent variables are correlated with FRAUD with a significance level of less than 0.2 (except for variables BIG4, TA<sub>c</sub>/TA, CL/TL, EQ/TL, INV). /CS, INV/TA, NI/EQ, SAL/CS).

##### **4.1.2. Check for multicollinearity**

The research team used Eview 8 software to test the correlation analysis between independent variables. Variables with a correlation coefficient  $\geq 0.8$  have high multicollinearity, whereas variables with a correlation coefficient  $< 0.8$  are considered to have negligible multicollinearity. The analysis results show that CA/CL is highly correlated with CA/TL, CASH/TA is highly correlated with CASH/CA, and EQ/TL is highly correlated with CA/TL. The research team will remove the variables with less statistical significance among the highly correlated pairs after the first model regression.

#### **4.2. Model 2**

##### **4.2.1. Check the correlation coefficient**

The research team used Eview 8 software to test the correlation analysis between the independent and dependent variables, fraud. First, variables with little correlation with the copy ( $p\text{-value} \geq 0.2$ ) were removed from the model. Correlation Analysis results show that most of the independent variables are correlated with FRAUD with a significance level of less than 0.2 (except CS/GP, INV/CA).

##### **4.2.2. Check for multicollinearity**

The research team used Eview 8 software to test the correlation analysis between independent variables. Variables with a correlation coefficient  $\geq 0.8$  are considered to have high multicollinearity, whereas variables with a correlation coefficient  $< 0.8$  are deemed negligible multicollinearity. The analysis results show that the variables are not highly correlated.

#### **4.3. Model 3**

##### **4.3.1. Check the correlation coefficient**

The research team used Eview 8 software to test the correlation analysis between the independent and dependent variables FRAUD. Variables with little correlation with FRAUD ( $p\text{-value} \geq 0.2$ ) were excluded from the model. Correlation Analysis results show that most independent variables correlate with FRAUD with a significance level of less than 0.2 (except for variables GP/FA, NI/CFO, CS/GP, EQ/LA. ).

##### **4.3.2. Check for multicollinearity**

The research team used Eview 8 software to test the correlation analysis between independent variables. Variables with a correlation coefficient  $\geq 0.8$  are considered to have high multicollinearity, whereas variables with a correlation coefficient  $< 0.8$  are deemed negligible multicollinearity. The analysis results show that most of the variables are not highly correlated with each other (except (CA-INV)/CL is positively correlated with CA/TL, CFO/CS is highly associated with CFO/SAL, and EBT/TA is highly correlated with CA/TA. Highly related to NI/TA, NI/CS to NI/SAL, NI/CS to OP/SAL, NI/SAL to OP/SAL).

#### **4.4. Combine models**

From the results of three regression models, I, II, and III, the research team modeled a matrix combining three models. Out of 80 fraud reports:

There were six undetected fraud reports or 7.5%.

There are seven reports that only 1 model can detect signs of fraud, equivalent to 8.75%

There are nine reports of 2 models that can detect signs of fraud, equivalent to 11.25%

There are 58 reports of all three models being detected as cheating, accounting for 72.5%

the combining of three models, 74 financial statements were found to have fraud in financial statements, equivalent to 92.5%

Of 464 non-fraudulent financial statements, 343 were not considered fraudulent when combining the three models, or 73.92%.

## 5. DISCUSSION AND RESULTS

### 5.1. Model results

From the results of the associative matrix model, we see:

With the model I:

Correct prediction rate of fraud report:  $62/80 = 77.5\%$

Correct prediction rate reporting no fraud:  $370/464 = 79.741\%$

Overall correct rate =  $(62+370)/544 = 79.412\%$

With Model II:

Correct prediction rate of reporting fraud:  $68/80 = 85\%$

Correct prediction rate reporting no fraud:  $364/464 = 78.448\%$

Overall correct rate =  $(68+364)/544 = 79.412\%$

With Model III:

Correct prediction rate of reporting fraud:  $69/80 = 86.250\%$

Correct prediction rate reporting no fraud:  $392/464 = 84.483\%$

Overall correct rate =  $(69+392)/544 = 84.743\%$

The combining of three models, 74 financial statements were found to have fraud in financial statements, equivalent to 92.5%

Of 464 non-fraudulent financial statements, 343 were not considered fraudulent when combining the three models, or 73.92%.

### 5.2. Discussion

With this model, it is possible to accurately predict fraudulent reports with a high rate of 92.5% while maintaining a high prediction rate of non-fraudulent financial statements at 73.92%, so the model is suitable for investors who do not want to invest in companies that cheat financial statements.

- ***Fraud identification solution***

With the factors of motivation and pressure, auditors need to pay attention to the indicators showing the company's profitability and ability to generate revenue. Abnormal fluctuations in these ratios indicate the instability of the company's financial position, leading to a higher likelihood of financial reporting fraud.

Given the opportunistic factors, the auditor should consider the debt-to-revenue ratio. If this ratio is higher than the general average, the company will likely inflate revenue through receivables or not recording provisions.



With the attitude factor, the auditor can rely on past audits' results to assess management's attitude and ethics. As a result, the likelihood of fraud in the financial statements is higher.

- ***Solutions to prevent financial reporting fraud***

There are training programs: "Business Ethics and Compliance."

Build an effective internal control system with strict regulations and clear assignment of powers and obligations of internal control.

Strengthen the auditor's responsibility for fraud in the audit of financial statements.

Need to have more understanding of economics, finance, and even accounting and learn more about the company.

Sanctions for financial reporting fraud should be strengthened.

## **6. CONCLUSION**

In the study, the research team focused on understanding the motivations based on Vietnamese auditing standards for fraud assessment. The content introduces fraud theories and sets out the telltale signs that this company is cheating on its financial statements.

The study contributes to the experimentation of the underlying fraud theories by investigating the characteristics of companies that violate accounting standards and make disclosure errors. Honest. After this process, the study provided objective observational evidence about the financial reporting process of potentially fraudulent companies.

The study has built a solid theoretical foundation based on the fraudulent triangle theory to apply to fraudulent financial statements, building models with many observations with high representativeness. The study has successfully built three fraud detection models with high accuracy and created a combined matrix model to identify the most fraudulent financial statements. At the same time, the correct prediction rate for the companies is not high. Fraud is still at a high level, and at the same time, some suggestions are proposed to improve the ability to identify fraudulent financial statements. The research and outputs show that university students, with the proper guidance, can deliver quality academic work at minimal cost and beneficial results (Vuong, 2018).

There are some limitations still exist. The study was only conducted on the data of companies on HOSE in 2019-2022, so the overall reflection of the companies listed on the stock exchange is still limited and has not yet reflected the situation. Financial reporting fraud in the period before 2019.

In addition, the variables representing the fraudulent triangle have limitations. Few variables represent the chance factors for fraudulent behavior, and only the variable REC/REV can distinguish fraudulent behavior. There are no variables representing the method of fraud through inventory. This is because no expenses, etc., can determine fraudulent and non-fraudulent financial statements. In addition, the study does not have variables representing the quality of internal control and lacks variables representing attitudes and ethics. Finally, in the research model, no variables represent assets whose value is less under the power of the enterprise, such as short-term and long-term securities. The above is one of the main cheating methods but has not been shown through the model variables.

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## THE IMPACT OF THE CAPITAL STRUCTURE ON PERFORMANCE OF THE MANUFACTURING COMPANIES LISTED ON VIETNAM STOCK EXCHANGE

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*ABSTRACT: This study investigates the impact of capital structure on firm performance of manufacturing companies listed on the Vietnam Stock Exchange. Simultaneously, outline the findings of past empirical studies on the influence of capital structure on performance. Create a model and assess the impact of capital structure elements and the link between capital structure and firm performance on 185 Vietnamese manufacturing companies listed on the Vietnam stock exchange from the years 2016 to 2020. The paper indicates that capital structure has a negative impact on firm performance. Moreover, the study points that current ratio have a negative influence on the debt ratio*

*Keywords: Capital structure, firm performance, manufacturing companies, Vietnam's stock exchange.*

### 1. INTRODUCTION

The emergence of numerous businesses has considerably aided Vietnam's economic growth in the framework of the nowadays global economic integration, specifically in the manufacturing sector. The State and the Government are particularly interested in this industry because production is the process of creating goods for use, or for exchange in commerce, and plays the role as a determining factor in the livelihoods of people. The survival and development of humans and society is a fundamental activity that gives rise to and develops human social relationships, it is the basis of the formation, transformation and development of the human society.

A manufacturing enterprise in particular, or all businesses in all fields in general, need initial capital to serve the operational needs of the business. All businesses must balance the optimal capital structure in order to minimize the cost of capital. An enterprise can use the appropriated capital to reduce the burden from the cost of using a bank loan, or take advantage of the tax shield from debt, or issue more common shares to reduce the cost of using retained earnings for reinvestment.

Nevertheless, we can see that capital structure, or capital policy has a significant impact on the performance of listed manufacturing enterprises in Vietnam today, and the study of "The impact of the capital structure on the performance of the manufacturing companies listed on the Vietnamese stock exchange" is an extreme necessity.

The objective of the research paper is to build a regression model in order to determine the influence of capital structure on performance of listed manufacturing enterprises in Vietnam through the use of regression analysis. According to that, the study offers a number of solutions to help enterprises build a reasonable capital structure, thereby optimizing performance efficiency and minimizing cost burden. The subsequent activities must be carried out so as to achieve the target: Firstly, we state the general theory on capital structure and performance of listed manufacturing enterprises in Vietnam. Secondly, we provide

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an overview of capital structure and performance of listed manufacturing enterprises in Vietnam. Thirdly, we propose research hypothesis and regression model to evaluate the influence of capital structure on the performance of listed manufacturing enterprises in Vietnam and finally, we propose a system of solutions aimed at helping enterprises choose the most optimal capital structure, thereby maximizing performance.

The research paper studies the impact of the capital structure on the performance of manufacturing companies listed on Vietnam stock exchange during the 5-year period from 2016 to 2020. The authors selected the period from 2016 to 2020 to assess the impact of capital structure on the performance of listed manufacturing enterprises in Vietnam in two situations: with and without the effects of the Covid-19 pandemic. Assessing the impact of capital structure on the performance both with and without the Covid-19 pandemic is very important because the plan to build the capital structure of manufacturing enterprises is a long-term decision, but the Covid pandemic may cause decisions to change abruptly.

## **2. THEORETICAL FRAMEWORK:**

### **2.1. Theory related to the capital structure of the company:**

#### **2.1.1. M&M theory on the capital structure of a business:**

This theory was proposed by two researchers Franco Modigliani and Merton Miller in 1958, so it is often referred to as M&M theory. M&M theory is based on the following important assumptions: tax assumption, transaction cost assumption, cost of financial distress assumption, and perfect capital market assumption as follows:

In terms of content, M&M theory is stated in two important propositions: The first is about the value of the company, and the second is about the company's cost of capital. These clauses are considered in turn in two cases: with tax and without tax.

The result of the theory argues that in a perfect market, the capital structure does not affect business value. Therefore, there is no optimal capital structure for a business-specific profession. However, the assumptions of such a perfect market as there are no costs transaction fees, no taxes, asymmetric information, and a borrowing rate equal to the risk-free rate are not suitable for the actual operating environment of the enterprise. So, researchers make assumptions about the firm's value and performance are affected by capital structure.

#### **2.1.2. Theory of the optimal capital structure:**

The theory of optimal capital structure is also known as the traditional approach. This theory assumes that the cost of capital depends on the capital structure of the firm and that there is an optimal capital structure where the company's management can increase the value of the firm by using the ratio of appropriate financial leverage.

Under this approach, as the firm increases its use of debt, the firm can reduce its average cost of capital because the cost of debt is lower due to the corporate income tax savings. However, an increase in debt ratio also entails an increase in risk, so investors will demand a higher return on equity. But initially, an increase in the required rate of return will not completely erase the benefits of using debt as a cheaper source of capital until the investor continues to increase the rate of return and claims make the benefits of using debt no longer available. At a debt ratio where the required rate of return is just enough to make the benefits of using debt disappear, the firm has the lowest cost of capital. As the debt ratio continues to increase, the average cost of capital will increase.

The question is how to determine the optimal capital structure? This is always a difficult question for financial planners. Capital structure policy-making involves a trade-off between risk and return. On the one hand, using a lot of debt increases the risk for the company, but a high debt ratio generally leads to high expected returns. On the other hand, increased risk tends to lower the stock price, while high returns tend to increase the company's stock price. Based on the analysis of profit and risk, financial planners can make decisions about the optimal capital structure for the business - the capital structure at which the balance between profit and risk is achieved. that maximizes the company's stock price.

### **2.1.3. Pecking order theory:**

The pecking order theory suggests that managers prefer to finance investment opportunities using three sources: first through the firm's retained earnings, secondly through debt, and choosing shareholders' equity ranks the last.

The pecking order theory starts with asymmetric information - a phrase to show that managers know a lot about the potentials, risks, and values of the business. own business than outside investors.

Asymmetric information affects the choice between internal and external financing, and between new issuance of debt and equity securities.

This would lead to a pecking order, whereby investment projects would be financed first with internal capital, mainly profits for reinvestment, then new debt issuance, and finally by issuing new share capital.

The pecking order theory explains why firms with low profitability tend to take on more debt.

Not because they have higher target debt ratios but because they need more outside funding. Less profitable firms issue debt because they do not have the internal sources of funds for capital investment and because debt financing ranks first in a pecking order of external financing.

In pecking order theory, the attractiveness of the tax shield from debt is seen as the class effect of varying debt ratios in the presence of asymmetries of internal cash flows, and real investment opportunities. Profitable businesses with limited investment opportunities will strive for low debt ratios.

Businesses with greater investment opportunities than internally generated capital are forced to borrow more.

## **2.2. Recent researches of the impact of capital structure on performance and the impact of several factors on capital structure:**

### **2.2.1. Recent researches of the impact of capital structure on the performance of the enterprise:**

The relationship between capital structure and business performance has become one of the topics that attract the most attention and is also studied by many scientists around the world. Recent studies have come to a conclusion that capital structure has a significant influence on the performance of a business.

Weixu has studied the relationship between capital structure and performance based on research data of 1,130 companies listed on the Shanghai Stock Exchange, excluding those operating in financial sectors such as banks, insurance, financial companies. The research results show that the performance efficiency is greatly affected by the debt ratio variable. Debt ratio has a positive effect on operational efficiency at a low debt ratio and negative effect on a high debt ratio. The performance does not have a strong correlation with long-term debt ratio, the reason is that companies in China prefer short-term debt to long-term debt. Firm size variable (SIZE) has a positive effect on performance efficiency quite strongly in the linear model, and in the nonlinear model, SIZE has no effect. The variable growth rate of total assets (GROWTH) has no impact on performance in all 3 models.

Dimitris Margaritis & Maria Psillaki studied the relationship between capital structure, ownership and performance of a French corporation. The authors carried out a 2-way study, two regression models were built: Debt ratio model and factors affecting the commercial efficiency and the CPA model and factors affecting the debt ratio. The research results show that there is a causal relationship between the debt ratio and the efficiency and the efficiency and the impact on the debt ratio and vice versa.

Zeitun & Tian showed that the debt ratio variable has the strongest impact, this result is also consistent with previous studies and companies with a high proportion of fixed assets have low performance because they invest too much in fixed assets without improving operational efficiency. Business lines have a strong impact on operational efficiency in a number of fields: real estate, educational services, chemistry and oil, and tobacco.

Mahfuzah Salim & Dr. Raj Yadav studied the performance of 237 Malaysian companies from 1995 to 2011 from a financial and market perspective. The study gives 4 results: (i) performance measured by ROE, Tobin's Q shows the ratio of short-term debt ratio (STD), the ratio of long-term debt to total assets (LTD), Debt ratio has a negative impact on performance, however, performance measured by ROA shows that STD, LTD and TD have a negative impact on performance for afforestation companies and STD, LTD have a positive impact on performance for consumer goods companies; (ii) performance measured by EPS shows that STD, LTD, TD have a negative impact on performance for companies in the consumer goods, construction, and industrial products sectors, along with performance for companies in the afforestation and service business; (iii) Growth of revenue of total assets (GROWTH) has a positive impact on performance; (iv) Firm size (SIZE) has a positive effect on performance. The authors show that in each different industry, the performance measured by ROE, return on total assets (ROA), Tobin's Q, earnings per share (EPS) is subject to the effect is different in degree, marked by capital structure STD, LTD, TD and SIZE, GROWTH.

Research by Nguyen Hieu Thanh & Nguyen Anh Huu (2020) "The Impact of Capital structure on Firm Performance: Evidence from Vietnam" has assessed the impact of debt ratio on the performance of enterprises in Vietnam, can be shown through 3 models with dependent variables respectively ROA, ROE and EPS (GLS model). The research results show that the debt ratio (Total debt/Total assets) has a negative impact on the performance of enterprises. Unlike this study, when assessing the impact of capital structure on the performance of manufacturing enterprises in Vietnam, the authors use the fixed effect model (FEM) – a more suitable model for panel data.

As is evident, previous studies on the influence of capital structure on the performance of enterprises all lead to the same result that the debt ratio has a strong impact on the business performance of enterprises. However, most of the research period of previous research papers usually stopped at 2017-2018, the period when the Covid pandemic had not yet appeared. Therefore, the authors decided to evaluate the impact of capital structure on the performance of listed manufacturing enterprises in Vietnam in the period from 2016 to 2020 – a long enough time to have can be assessed both with and without the Covid-19 pandemic, thereby creating the novelty and creativity of the topic.

Based on the theories and empirical studies presented above, this study aims to study whether capital structure affects the performance of manufacturing enterprises listed on the Viet nam stock exchange in the period 2016-2020 or not. Therefore, the hypothesis is that capital structure has a relationship with the performance of construction enterprises listed on Vietnam's stock market in the period from 2016 to 2020.

The authors selected the period from 2016 to 2020 to assess the impact of capital structure on the performance of listed manufacturing enterprises in Vietnam in two situations: with and without effects of

the Covid-19 pandemic. Assessing the impact of capital structure on the performance both with and without the Covid-19 pandemic is very important because the plan to build capital structure of manufacturing enterprises is a long-term decision, but the Covid pandemic may cause decisions to change abruptly.

### **2.2.2. Recent researches of several factors that have impacts on the capital structure:**

Frank and Goyal (2009) studied the factors affecting the capital structure of non-financial companies in the US stock market in the period 1950-2000. The authors believe that the factors that positively affect capital structure include industry average debt ratio, collateral, firm size, and expected inflation; The factors that negatively affect the debt ratio are the market-to-book ratio, the bankruptcy risk according to Altman's Z-index, and dividend payments.

Deesomsak et al. (2004) clarifies the factors affecting the capital structure of enterprises operating in 4 countries in the Asia-Pacific region (Thailand, Malaysia, Singapore, and Australia) with an emphasis on financial institutions and legislation. The survey sample includes all non-financial enterprises listed on national stock exchanges during the study period. The study evaluated the impact of 6 independent variables including: ratio of tangible assets, profitability, size of business, non-debt tax shield, liquidity and revenue volatility on the dependent variable. financial leverage. The research results also confirm that the capital structure of enterprises is influenced by micro factors, including asset structure, profitability, size, non-debt tax shield, liquidity and variable. revenue activity.

Le Dat Chi (2013) has researched and tested the factors that play an important role in the capital structure decision of companies listed on the Vietnamese stock market in the period 2007-2010. The author has based on theories of capital structure such as trade-off theory, pecking order and market timing and behavioral finance theory. Research results have pointed out six factors that really play an important role: taxes, inflation, market-to-book ratio, industry leverage, return on assets (ROA), and administrator behavior.

In general, previous studies mostly used the dependent variable as ROA, ROE or EPS to show the performance of the business, besides, most of the studies used the independent variable as the coefficient. debt TDR to reflect capital structure. This is the basis for the authors to select variables and perform model regression. However, in the study, the authors used the dummy variable TDR\*COVID to further assess the influence of capital structure on performance in the context of the Covid-19 epidemic. The selected variables and the model are shown in below:

Applying the theories and empirical studies presented above, the hypothesis H0 of the model will be: Capital structure has an impact on business performance.

The model of the influence of capital structure on performance of listed manufacturing enterprises in Vietnam is built as follows:

**Model 1:**  $ROE_{it} = \beta_0 + \beta_1 TDR_{it} + \beta_2 STD_{it} + \beta_3 GROWTH_{it} + \beta_4 LIQUID_{it} + i.Yeari.id + u_{it}$  (The impact of capital structure measured by debt ratio on ROE in the absence of the Covid-19 epidemic)

**Model 2:**  $ROE_{it} = \beta_0 + \beta_1 TDR_{it} + \beta_2 STD_{it} + \beta_3 GROWTH_{it} + \beta_4 LIQUID_{it} + \beta_5 COVID + \beta_6 TDR*COVID + i.Yeari.id + u_{it}$  (The impact of capital structure measured by debt ratio on ROE in the context of the Covid-19 epidemic)

**Model 3:**  $ROA_{it} = \beta_0 + \beta_1 TDR_{it} + \beta_2 STD_{it} + \beta_3 GROWTH_{it} + \beta_4 LIQUID_{it} + i.Yeari.id + u_{it}$  (The impact of capital structure measured by debt ratio on ROA in the absence of Covid-19 epidemic)

**Model 4:**  $ROA_{it} = \beta_0 + \beta_1 TDR_{it} + \beta_2 STD_{it} + \beta_3 GROWTH_{it} + \beta_4 LIQUID_{it} + \beta_5 COVID + \beta_6 TDR*COVID + i.Yeari.id + u_{it}$  (The impact of capital structure measured by debt ratio on ROA in the context of the Covid-19 epidemic)

In the two models above, the variables ROE (Return on equity) and ROA (Return on assets) are two dependent variables representing performance.

The independent variable (the explanatory variable) is the TDR debt ratio.

**Table 1. Variable definition and Proxies.**

Variable names	Definition	Proxies
Dependent variables		
ROA	Return on Asset	Net income/Total Asset
ROE	Return on Equity	Net income/Shareholders' Equity
Independent variables		
TDR	Debt ratio	Total Debt/Total Asset
Control variables		
GROWTH	Enterprise Revenue Growth rate	Increase in the total Revenues/Total Revenues from the prior year's
LIQUID	Current ratio	Current assets/Current liabilities
Dummy variables		
TDR*COVID	Dummy variable	COVID = 1 when Year = 2020

*Source: Compiled by the author*

### 3. RESEARCH METHOD

#### 3.1. Data collection:

For our study, we will focus on the impact of capital structure on firm performance of the manufacturing companies listed on the Vietnam stock exchange. This study would cover the data of 185 manufacturing companies listed on the Vietnam Stock Exchange over the period of 5 years (from 2016 to 2020) which was gathered mostly from company financial statements, corporate associate announcements, reports, and yearbooks from the Stock Exchange and Fin's Pro Exchange computer system. Furthermore, only companies that were active during the examined period were considered. In addition, companies in our dataset are required to have reported a full annual account. The final sample consists of 185 firms with 925 observations.

#### 3.2 Data analysis

We used a package of STATA software version 17 to estimate the regression equations that we proposed above. First off, bivariate relations among variables were explored via examining correlation. Next, we used the Fixed effects model (FEM) to examine the effect of debt ratio on performance. The research also examined some necessary detector regressive assumptions to ensure the result of regression is blue such as autocorrelation and multicollinearity before the conclusion.

### 4. RESULTS AND DISCUSSION:

#### 4.1. Several necessary tests for the model:

*\*Descriptive summary:*

**Table 2. Descriptive summary**

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	N	mean	sd	min	max	p1
ROE	925	0.130	0.121	-0.247	0.494	-0.247
ROA	925	0.0695	0.0663	-0.0872	0.289	-0.0872



LTD	925	0.0525	0.0768	0	0.350	0
TDR	925	0.259	0.181	0	0.625	0
STD	925	0.205	0.154	0	0.577	0
GROWTH	925	0.107	0.343	-0.488	2.132	-0.488
LIQUID	925	2.284	1.901	0.500	12.37	0.500
COVID	925	0.200	0.400	0	1	0
TDR*COVID	925	0.0483	0.124	0	0.619	0
Number of id	185	185	185	185	185	185

Source: Calculation and synthesis of the author team from Stata software.

From the table above, we can see that ROE of listed manufacturing companies in Vietnam in the period from 2016 to 2020 has an average value of 0.130. Compared to many other professions, this is an average return on equity. However, when looking at the min and max values, we can see that many manufacturing firms are not efficient when their ROE is less than 0 and there are also some businesses that perform relatively well when ROE is at 0.494. The average debt ratio is not high (nearly 26%) and ranges from 0 to 0.625. Thus, we can see that besides a large number of businesses that mainly use equity, there are also businesses that use financial leverage. In addition, the dummy variables COVID and TDR\*COVID will clarify the impact of the epidemic on the performance of listed manufacturing companies, and will also demonstrate that COVID will amplify the impact of the pandemic. TDR to ROA and ROE, thereby inferring that in disease conditions, the more businesses borrow, the more financial risks they will face.

\* Correlation matrix:

**Table 3: Correlation matrix**

	ROE	ROA	TDR	STD	GROWTH	LIQUID_w	COVID	TDR*COVID
ROE	1							
ROA	0.876***	1						
TDR	-0.109***	-0.354***	1					
STD	-0.0603	-0.287***	0.898***	1				
GROWTH	0.131***	0.0959**	0.116***	0.0658*	1			
LIQUID	0.0122	0.0260	-0.112***	-0.118***	-0.0334	1		
COVID	-0.0757*	-0.0561	-0.0485	-0.0317	-0.0969**	-0.00156	1	
TDR*COVID	-0.0980**	-0.145***	0.231***	0.214***	-0.0294	-0.0227	0.779***	1

Source: Calculation and synthesis of the author team from Stata software.

The table above shows us the correlation between the variables used in the research model. We can see that most of the variables are relatively closely correlated with each other.

\* Hausman test:

**Table 4. Hausman test for the models**

Model	Hausman test	Selected model
Model 1	P-value = 1.42% (< 5%)	FEM
Model 2	P-value = 0.26% (< 5%)	FEM
Model 3	P-value = 0.6% (< 5%)	FEM
Model 4	P-value = 0.00% (< 5%)	FEM

Source: Calculation and synthesis of the author team from Stata software.

The authors conduct Hausman test in order to consider whether Fixed effect model or Random effect model is chosen. The result shows that the P-value of the 4 models are all less than 5%, which means that the FEM is suitable.

***\*Testing the phenomenon of variable variance with FEM model:***

To test the phenomenon of variable variance with the FEM model, the study uses the test with the following hypotheses:

- Hypothesis H0: The model does not have variable variance.
- Hypothesis H1: The model has variable variance.

After performing the test, if the P-value is greater than 5%, the study will accept the hypothesis H0. Otherwise, the hypothesis H0 will be rejected and the model will have variable variance.

The results are shown in the following table:

**Table 5. Testing the phenomenon of variable variance with FEM model**

Model	Modified Wald test	Results
Model 1	P-value = 100% (> 5%)	The model does not have variable variance
Model 2	P-value = 100% (> 5%)	The model does not have variable variance
Model 3	P-value = 100% (> 5%)	The model does not have variable variance
Model 4	P-value = 72.48% (> 5%)	The model does not have variable variance

*Source: Calculation and synthesis of the author team from Stata software.*

***\*Test the phenomenon of autocorrelation with the FEM model:***

To test the phenomenon of autocorrelation with the FEM model, the study uses Wooldridge test with the following hypotheses:

- Hypothesis H0: The model does not have autocorrelation.
- Hypothesis H1: The model has autocorrelation.

After performing the test, if the P-value is greater than 5%, the study will accept the hypothesis H0. Otherwise, hypothesis H0 will be rejected and the model occurs autocorrelation.

The result of Wooldridge test is as follows:

**Table 6. Test the phenomenon of autocorrelation with the FEM model**

Model	Wooldridge test	Results
Model 1	P-value = 9.89% (> 5%)	The model does not have autocorrelation
Model 2	P-value = 9.58% (> 5%)	The model does not occur autocorrelation
Model 3	P-value = 5.17% (> 5%)	The model does not have autocorrelation
Model 4	P-value = 6.41% (> 5%)	The model does not occur autocorrelation

*(Source: Calculation and synthesis of the author team from Stata software)*

**4.2. Findings and discussion:**

*\* Researching the impact of the capital structure on performance of the manufacturing companies listed on the Vietnam Stock Exchange (with and without the impact of Covid-19 epidemic)*

After several tests for the models, we have concluded that: (i) The Fixed effects model (FEM) is suitable and the models do not have any defect (autocorrelation and variable variance). The quantitative analysis results of the performance efficiency with the dependent variables ROE and ROA with and without the impact of Covid-19 epidemic are as follow:

**Table 7. The quantitative analysis results of the performance efficiency with the dependent variables ROE and ROA with and without the impact of Covid-19 epidemic**

VARIABLES	ROE_w	ROA_w	ROE_w	ROA_w
ROE_w				
TDR_w	-0.0879***	-0.138***	-0.0938***	-0.141***
	(-1.439)	(-5.160)	(-1.547)	(-5.299)
STD_w	-0.0373	0.0363	-0.0379	0.0360
	(-0.502)	(1.114)	(-0.510)	(1.106)
GROWTH_w	0.0440***	0.0216***	0.0439***	0.0216***
	(4.887)	(5.480)	(4.877)	(5.470)
LIQUID_w	0.00179*	0.000327*	0.00177*	0.000315*
	(0.578)	(0.241)	(0.570)	(0.232)
COVID	-0.0281***	-0.0158***		
	(-2.243)	(-2.873)		
TDR*COVID	-0.0311*	-0.0143*		
	(-0.812)	(-0.851)		
2020o.Year	-	-		
ROA_w				
Constant	0.180***	0.107***	0.182***	0.108***
	(4.452)	(6.033)	(4.515)	(6.102)
Number of ID	185	185	185	185
Observations	925	925	925	925
Adjusted R-squared	0.577	0.728	0.577	0.728

(Source: Calculation and synthesis of the author team from Stata software)

The table indicates the quantitative analysis results of the performance with the dependent variables ROE and ROA with and without the impact of Covid-19 epidemic. We see that the ratio of determination R<sup>2</sup> is quite high (0.557 and 0.728 respectively), indicating that the model's fit is 55.7% and 72.8%, in other words, the independent variables have been selected in the explained model obtained 55.7% of the variation of the dependent variable ROE and 72.8% of the variation of the dependent variable ROA. The selected variables are quite suitable for the research model.

The variable STD (short-term debt ratio) has no statistical significance for the business performance of listed manufacturing companies in Vietnam in the period from 2016 to 2020. Enterprises all use a lot of short-term debt in their total loans, but that number does not significantly affect business performance.

In the case when there is no impact of the Covid-19 epidemic, the debt ratio (TDR) has a negative effect on ROE. These two indicators only affect in the same direction when the BEP is larger than the bank loan interest rate. But as mentioned above, due to the recent trend of increasing interest rates on bank loans, the (BEP - r) is always smaller than 0. This leads to the more the enterprises try to borrow, the more significant the performance decreases. More specifically, when businesses increase TDR by 1%, ROE will decrease by 0.094% (in the absence of epidemics), which is a very large number. Similarly, the TDR indicator also has a negative impact on ROA. Specifically, in the absence of Covid, when TDR increases by 1%, ROA will decrease by 0.141%. Covid 19 pandemic amplifies the effect of debt ratio on ROE and ROA. More specifically, in the case when Covid-19

epidemic occurred, the debt ratio (TDR) has a negative effect on ROE. These two indicators only affect in the same direction when the BEP is larger than the bank loan interest rate. But as mentioned above, due to the recent trend of increasing interest rates on bank loans, the  $(BEP - r)$  is always smaller than 0. This leads to the more the enterprises try to borrow, the more significantly the performance decreased. More specifically, when businesses increase TDR by 1%, ROE will decrease to  $0.0879\% + 0.0311\% = 0.119\%$  (in epidemic conditions), which is a very large number. Similarly, the TDR indicator also has a negative impact on ROA. Specifically, under Covid conditions, when TDR increases by 1%, ROA will decrease by  $0.138\% + 0.0142\% = 0.1522\%$ . These numbers are completely larger than the effect of TDR on ROE and ROA in the absence of disease. This proves that Covid-19 has amplified the effect of TDR on ROE and ROA.

The variable Growth of Revenue (GROWTH) has a positive effect on ROE and ROA, specifically, when revenue grows 1%, ROE grows by 0.0439%, ROA increases by 0.0216% (without the impact of Covid-19 epidemic), and the same level of the increase occurred in the context of the Covid-19 epidemic. A manufacturing enterprise that wants to have growth in ROE and ROA must definitely aim for revenue growth because increased revenue means that the business's market share is expanded, production scale is larger, and freeing up a lot of inventory.

The current ratio also has a positive effect on ROE and ROA. This is reasonable with economic theory and previous studies because when a business is able to pay its debts as they come due, it means that the business has good business performance.

The epidemic can amplify the impact of capital structure on business performance in a negative way, but we can see that TDR is also an effective channel to reduce the impact of the pandemic. Specifically, in disease conditions, when reducing TDR by 1%, ROE will increase to 0.1198% and ROA will increase by 0.1522%. Thus, in the context of the epidemic, the more businesses limit borrowing, the more opportunities they will have to improve business performance.

*\*Research on factors affecting capital structure of listed manufacturing companies in Vietnam:*

Based on the research hypotheses and research model developed in Chapter 1, the results of the study of the factors affecting the capital structure of construction companies in the sample are as follows:

**Table 8. Descriptive summary of the variables that have impacts on capital structure of the enterprise**

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max	(6) p1	(7) p25	(8) p50	(9) p75	(10) p99
TDR	925	0.259	0.181	0	0.625	0	0.102	0.240	0.403	0.625
GROWTH	925	0.107	0.343	-0.488	2.132	-0.488	-0.0514	0.0466	0.171	2.132
LIQUID	925	2.284	1.901	0.500	12.37	0.500	1.216	1.678	2.559	12.37
COVID	925	0.200	0.400	0	1	0	0	0	0	1
LIQUID*COVID	925	0.456	1.268	0	12.32	0	0	0	0	6.551
Number of id	185	185	185	185	185	185	185	185	185	185

(Source: Calculation and synthesis of the author team from Stata software)

Looking at the table, we can see that the average debt ratio of the listed manufacturing enterprises in Vietnam studied in the period 2016-2020 is 25.9%. This shows that in the research period, the manufacturing enterprises did not depend too much on loans. The average current ratio is greater than 2, showing that the ability to pay debts when they due is very good, they do not have to face financial risks.

**Table 9. Average of several ratios related to the impact of some variables that have impacts on the capital structure of the firm**

Variables	2016	2017	2018	2019	2020
TDR	0.26	0.27	0.27	0.26	0.24
GROWTH	0.26	0.17	0.21	0.09	0.04
LIQUID	2.39	2.66	2.38	2.15	2.28

(Source: Calculation and synthesis of the author team from Excel software)

The table above shows us that the debt ratio over the years of listed manufacturing companies in Vietnam is not high, only about 20% to 30%, tends to increase from 2016 to 2018, then tends to increase again. The current ratio is all greater than 1, showing a slight downward trend from 2018 to 2020. In general, manufacturing enterprises have good financial capacity and do not face payment risks. However, the growth of revenue is not too significant.

**\* Correlation analysis between variables:**

**Table 10. Pairwise correlation test for the variables that have impacts on the capital structure of the company.**

	TDR	GROWTH	LIQUID	COVID	LIQUID*COVID
TDR	1				
GROWTH	0.116***	1			
LIQUID	-0.112***	-0.0334	1		
COVID	-0.0485	-0.0969**	-0.00156	1	
LIQUID*COVID	-0.0569	-0.0490	0.321***	0.719***	1

*t* statistics in parentheses

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

(Source: Calculation and synthesis of the author team from Stata software)

Looking at the table above, we can see that the correlation between the independent variables is not too large. The results table also shows that the debt ratio and solvency have a negative relationship and a positive correlation of the remaining variables compared to the debt ratio. However, the LIQUID\*COVID dummy variable does not have too much statistical significance with the capital structure. This can be explained by the fact that whether there is an epidemic or not, businesses still maintain their solvency at a good level and therefore they do not have much need to depend on loans, especially when the BEP of enterprises is not high.

**\*Quantitative analysis results:**

The table below will show us the results of quantitative analysis of factors affecting the debt ratio of listed manufacturing companies in Vietnam.

**Table 11. The quantitative analysis result for the impact of several variables on the capital structure of the company**

	(1)	(2)
VARIABLES	TDR	TDR
TDR		
GROWTH	0.00989	0.00922
	(1.030)	(0.960)

LIQUID	-0.00962***	-0.0107***
	(-2.939)	(-3.166)
COVID		-0.0283**
		(-2.309)
LIQUID*COVID		0.00466
		(1.287)
2020o.Year		-
Constant	0.504***	0.506***
	(12.93)	(12.98)
Observations	925	925
Adjusted R-squared	0.785	0.785
Number of id	185	185

t-statistics in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

(Source: Calculation and synthesis of the author team from Stata software)

Interpretation of results: The regression value reported in the table shows the regression results of the dependent variable TDR (debt ratio) with the independent variables as GROWTH (growth of revenue), LIQUID (current ratio) and dummy variables COVID and TDR\*COVID

The ratio of determination  $R^2 = 0.785$  is quite high, showing that the independent variables selected in the model explained 78.5% of the variance of the debt ratio.

Through the model regression results, we can see that only the current ratio has an impact on the debt ratio of the enterprise, and has a negative effect both in the presence of an epidemic and in the absence of an epidemic. When there is no epidemic, if the current ratio is increased to 1%, the debt ratio will decrease by 0.00962%, while during the epidemic, the debt ratio will decrease by  $0.0107\% - 0.00466\% = 0.00604\%$ . This shows that in both epidemic and non-epidemic conditions, the current ratio always has a negative impact on the debt ratio. This is completely reasonable and is a good sign that even in complicated disease conditions, listed manufacturing enterprises in Vietnam also have good financial situation and do not depend much on loans. The Covid epidemic does not amplify but reduce the impact of the current ratio on the debt ratio. It can be seen that, in the context of complicated epidemics, when businesses have better ability to pay short-term debts, the debt ratio does not decrease more than in the absence of the epidemic. They still need loan capital to maintain the production capacity of the business, although at that time production activities have slowed down significantly, they still have good control over their debt repayment capacity and still maintain their self-sufficiency.

## 5. CONCLUSION:

### 5.1. Evaluate the research results:

From the above quantitative studies, the authors found that capital structure has an influence on firm value, shown in ROE and ROA variables. Besides, the authors also find that the debt ratio of manufacturing companies in the research period is not high, the companies mainly use short-term debt. This leads to the fact that manufacturing enterprises usually do not borrow much. In fact, this is also an industry on the list of credit squeezes due to increasing bank interest rates. Moreover, in the years of facing the Covid-19 pandemic, getting loans has also become much more difficult.

Research results also show that in the context of the Covid-19 epidemic, when increasing the debt ratio, performance decreases more sharply. This is completely reasonable because then, if you mobilize more loans, it will increase the pressure of debt payment, besides, the production is stalled, can't sell goods, there will be no money to pay. debt repayment, financial autonomy decreased and business performance was no longer maintained. In fact, manufacturing enterprises have done a great job in maintaining stability in difficult times when they still maintain a low debt ratio and current ratio, which is a very good sign for the manufacturing industry in Vietnam in the future.

In order to understand more deeply the causes of not using much debt, the authors have also assessed through a quantitative model and have found the current ratio in the period 2016-2020 that has an impact on the debt ratio of the studied manufacturing enterprises. Specifically, manufacturing enterprises in Vietnam have very good solvency, they have high financial autonomy, which leads to them not having to rely too much on loans. As one of the areas where credit is tight, having to maintain operations in the context of increasing interest rates on bank loans in recent years, the less use of loans, the more benefits for them, and they have very good control over their solvency. Therefore, adjusting or affecting this factor will help businesses achieve an appropriate capital structure.

## **5.2. Solutions to build capital structure to increase the performance of listed manufacturing enterprises in Vietnam:**

### ***5.2.1. Limiting mobilizing additional loans and prioritizing the use of equity:***

Manufacturing enterprises listed in Vietnam in the 5-year period from 2016 to 2020 had low debt ratios, good solvency and financial autonomy even during the pandemic. Therefore, they do not need to raise additional loans. Using borrowed capital to take advantage of the tax shield is a way many businesses use to reduce WACC. However, for manufacturing businesses, it does not seem to be a good way. The fact that interest rates on bank loans have tended to increase in recent years will make the benefit from tax shields no longer useful; even a high interest rate will increase WACC and contribute to a decrease in business efficiency. And yet, as analyzed in Chapter 3, the increase in loans will reduce the performance of manufacturing enterprises in Vietnam because the BEP of these enterprises is not too high and is not higher than the interest rate on a bank loan. Therefore, it is not necessary for manufacturing enterprises in Vietnam to take the risk of borrowing while they have enough equity to finance their capital needs.

### ***5.2.2. Using retained earnings to reinvest:***

The use of retained earnings to reinvest in more modern and advanced production lines has numerous advantages for Vietnamese manufacturing firms. Because their business is efficient and profitable, the remaining profits can be used to invest in fixed assets and modern production lines. Not only does it help to stabilize the capital structure, but reinvesting profits in modern production equipment is a solution that many manufacturing firms use because it provides benefits such as:

- Modern equipment and machinery will help businesses make a strong impression in the eyes of partners, thereby allowing them to sign many production and supply contracts with a higher value and significantly improve their performance.

- Investing in modern equipment and machinery will save a lot of time and money, especially labor costs. Reducing costs will help increase profits and increase the business efficiency of enterprises. In addition, reducing costs can also make a company's BEP higher, thereby creating favorable conditions for enterprises to use financial leverage to amplify ROE, thereby increasing business efficiency. business from the impact of capital structure.

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## RESEARCH THE FACTORS AFFECTING THE RISK OF BANKRUPTCY OF THE REAL ESTATE ENTERPRISES LISTED ON VIETNAM STOCK MARKET

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**ABSTRACT:** *The study shows the impact of factors on bankruptcy risk of real estate businesses. The study was conducted on 60 enterprises listed on the stock exchange in Vietnam in the period 2011 - 2021. The study was carried out on STATA 15 software, using random effects research model (REM), and use related tests to give the results that have 5 variables affecting the bankruptcy risk of enterprises: Current Ratio (CR), Asset Liquid Ratio (ALR), Financial Leverage (FL), Basic Earning Power Ratio (BEP), Fixed Asset Ratio (FA). The objective of the study is to study the factors affecting the bankruptcy risk of enterprises and the applicability of the research to the situation of listed real estate enterprises in Vietnam. Proposals drawn from the results of the study can help real estate businesses come up with appropriate strategies from time to time to prevent and respond to market conditions when businesses appear to sign bankruptcy risk.*

**Keyword:** *Real estate business, Logit model, Factors, Bankruptcy risk*

### 1. INTRODUCTION

According to Clause 1, Article 3 of The Real Estate Enterprises Law 2014: “Real estate business is capital investments to carry out activities that are construction activities; buying or receiving transfer to sell or transferring; property for lease; real estate brokerage services; real estate transaction platform services; real estate consulting services; management of real estate assets to make profits”. The real estate business has significant advantages in the market business that impacts extremely on market economy and influence on various other fields. Hence investors have many opportunities to make profits, which promotes development of real estate business.

Each economic sector has its own unique characteristics that are also found in real estate enterprises. Moreover, real estate is a “special commodity” which is different from normal commodities. Mostly, In this area businesses have unique characteristics such as: comprehensive style investment but regional quality, significant inventory and capital investments, and a long business period. Owner’s equity is small with a long business cycle through many years, long capital recovery and capital is medium to turnover. Therefore their characteristics impact on developing business and also real estate enterprise. On the other hand, in an overheating period, the real estate market has a cycle nature, so businesses can be sold out goods or products which are not available. Beside, the real estate enterprises have to face many misfortunes because of large capital and long cycle business. If administrators can’t judge exactly trends in the market, companies will lose capital or sell low price products. Also government’s policies can put real estate projects on losing advantages. Furthermore The difference between maturity and interest in raising capital and borrowing money causes the risk of financial and real estate markets.

For about ten years in Vietnam, macroeconomics has been stable: low inflation is controlled by the government, economic growth is good which attaches to quality, and economic balances are improved. By contrast, Vietnam is a developing country, so it has to face a lot of difficulties. Nowadays economic opening

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has been elevated, which means keen competition. Thus, the risk of liquidity in real estate enterprises is high. According to 51/2014/QH13 Clause 4, Chapter 4 in Law of bankruptcy: “Bankruptcy is a business or organization condition which loses liquidity ability because The People’s Court decides to declare bankruptcy. A business or organization loses liquidity that fails to pay debt obligation during 3 months, beginning maturity”. The risk of bankruptcy in a company is an objective economic phenomenon in the market economy that causes conflict between participants. As a result, the participants in the economy have to comprehend this definition. In conclusion, Bankruptcy is an unwanted condition because that has negative impacts on the company and economy.

The analysis of bankruptcy is an effective tool which manages a company. The risk assessment of bankruptcy makes important sense which supports administration to assess risk of bankruptcy. The analysis results in risk of bankruptcy as a basis to offer management decisions and prevent bankruptcy opportunely. Because of negative impacts, the participants and the real estate company have to recognize the signs of risk of bankruptcy to avoid. Recognizing the signs of risk of bankruptcy have to be acknowledged by different positions which are investors, administrators, investment funds, credit institutions, and the government.

Based on previous research and relevant documents, the group of authors summarize the main factors that assess the level of the risk of bankruptcy in a company: Net Working Revenue (NWC); Return On Asset (ROA); Difference between Total Assets and Total Liabilities (CL). According to the authors’ research, hypothesis claims: If a company gets into one of 3 bad cases above, it will be considered to have the risk of bankruptcy. This article researches the facts that influence the risk of bankruptcy in the real estate enterprises listed on the Vietnam stock market through quantitative research and the Logit model. Therefore, the group of authors proposes suitable solutions to reduce the risks in the real estate enterprises in Vietnam.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Overview**

#### ***2.1.1. The current state of study globally***

Bankruptcy is always a situation that every business has to face, and all over the world, there is much research about bankruptcy risk prediction as well as dealing with its risk using a variety of methods.

Firstly, analyze the bankruptcy risk of businesses based on their financial statements. Some remarkable works based on this method are Beaver (1996), Altman (1968), Ohlson (1980), and so on. To begin with, Edward I. Altman must be mentioned, who researched and used the Z-score model to help businesses evaluate bankruptcy risk based on calculating their annual financial statements. Results had shown that if the Z-score is less than 1.81, the company is at risk of bankruptcy; if the Z-score is between 1.81 and 2.99, it cannot be clearly considered; and if the Z-score is greater than 2.99, the company is not at risk of bankruptcy. However, the original Altman Z-score model does not have high accuracy in predicting bankruptcy over many years of research, so Altman re-evaluated the entire model with the book value of equity replacing the market value of variable  $X_4$ . The adjusted Altman Z'-score model has the following Z'-score threshold points: if Z' is less than 1.23, the company is at risk of bankruptcy; companies with Z'-score from 1.23 to 2.9 are in an undetermined zone; and if Z' is greater than 2.9, the company is not at risk of bankruptcy. Later, Altman, Hatzell, and Peck (1995) conducted a study on the Z''-score model for bankruptcy risk forecasting in economic enterprises, using four very useful variables in the industrial sector, including significant differences in asset sponsorship among companies. The Z''-score index thresholds are as follows: if Z'' is less than 1.1, the enterprise is at risk of bankruptcy; if Z'' is from 1.1 to 2.6, it is not possible to conclusively determine the situation; if Z'' is more than 2.6, the enterprise is not at risk of bankruptcy. This model has been applied by many authors, including Micha (1984), Altman and colleagues (1977, 1995, 2000), Pranee Leksriskul, and Michael Evans (2005), among others. There

are also other notable studies on bankruptcy risk, such as that of Beaver, which began in 1966 with the topic “Financial ratios as predictors of failure”. Through the evaluation of individual financial ratios, Beaver showed that the cash ratio to total debt is the most important criterion in predicting financial distress and bankruptcy of enterprises. In addition to this ratio, the rate of return on assets and the debt ratio reflect the effectiveness of the enterprise’s business operations and the level of financial risk it faces. However, when only individual ratios are studied, it is difficult to assess the overall financial situation; therefore, the assessment of the bankruptcy risk of the enterprise is inaccurate on the overall aspect. Then, James A. Ohlson (1980) developed the logit regression model with the O-score coefficient in the study “Financial Ratios and the Probabilistic Prediction of Bankruptcy” to study the ability to predict bankruptcy. This model requires fewer statistical hypotheses and provides more practical distinctions than Altman’s MDA model, but fundamentally, the experimental results of these two models are relatively consistent. Many authors have also used the Logit model for their studies, such as Aziz and colleagues (1988), Keasey and Watson (1987), and Ooghe and colleagues (1995), among others.

Secondly, analyze the bankruptcy risk of businesses based on market factors. This method combines the leverage structure of the company and the market value of its assets. Hillegeist and his colleagues (2004) concluded that using market factors provides significantly more information about a company’s likelihood of bankruptcy than using accounting factors. A disadvantage of this method is that it relies on the efficient market hypothesis and only considers listed companies, not private ones (Berg, 2007).

Thirdly, analyze the bankruptcy risk of businesses based on artificial intelligence. Odom and Sharda (1990) developed an artificial intelligence model to predict bankruptcy and compared the results with MDA discriminant analysis for classification accuracy. Coats and Font (1993) used an artificial intelligence model to estimate the health of companies, and the result they gave was that the artificial intelligence method is more efficient than the MDA discriminant analysis one.

### ***2.1.2. The current state of study in Vietnam***

In Vietnam, recently, the increasing mention of bankruptcy indicates that the market in general, and the real estate business in particular, have prepared themselves mentally and with necessary conditions for the worst possible situation. There have been many domestic studies on the factors affecting bankruptcy risk, such as author Nguyen Bao Khang (2012) studying the factors affecting business bankruptcy in Dong Nai province. Regarding the Altman Z-score model, authors Nguyen Thanh Cuong and Pham The Anh (2010) conducted a research titled “Risk assessment of bankruptcy for seafood processing companies listed on the Vietnamese stock market”. In addition, there are variety of studies on the bankruptcy risk of businesses such as authors Nguyen Phuc Canh and Vu Xuan Hung (2014) with the topic “Application of Z-score model in credit risk management for Vietnamese commercial banks”; the author Nguyen Thi Tuyet Lan (2019) with the topic “Factors influencing bankruptcy risks of listed construction businesses in Vietnam”; the author Truong The Quang (2022) with the topic “Financial factors affecting bankruptcy risks of listed construction and real estate businesses on the Vietnamese securities market”... In general, the majority of studies focus on the application of the Z-score model for risk management by Edward I. Altman (1968) to assess the risk of bankruptcy based on calculations from annual financial reports. Each study has its achievements but also some limitations. Along with using the Z-score model, many researchers also choose the Logit model to evaluate the impact of factors on bankruptcy risk. An exemplary research paper such as “Study on the factors impacting bankruptcy risk of listed real estate companies in Vietnam” authored by Phan Tran Trung Dung, Nguyen Thi Ha Thanh, Vo Minh Thu. Another research paper titled “Some factors affecting financial risk - Study of real estate listed companies on the Ho Chi Minh Stock Exchange (HSX)”; authored by Vo Minh Long.

## **2.2. Advantages, disadvantages of previous research and the novelty of the topic**

Each research article has its own unique characteristics, but overall, they all have some advantages and disadvantages as follows:

In terms of advantages, foreign research works are considered the foundation for building models for future research articles, as well as the root of the extended models applied to most business models, including real estate businesses. Recently, research has conducted surveys from research businesses and used quantitative methods in studies such as applying the Z-score model of Altman. Moreover, most of the author's domestic studies have focused deeply on analyzing a specific financial aspect of a business, giving researchers many tools to access research issues. Overall, the studies have identified limitations in analyzing the financial situation or in a specific financial aspect to provide remedies under normal circumstances.

Regarding disadvantages, there has not been any research specifically conducted for the listed real estate company, and there is no organization that performs credit ratings and bankruptcy risk warnings for real estate businesses in Vietnam. In Vietnam, there are few studies that consider the overall impact of macro or micro factors on the bankruptcy risk of businesses. Additionally, previous studies still have some issues that can be further explored, and many models have been introduced, such as Z-score, Logit, etc. To predict the risk, but the shortcomings of each model still cannot be overcome. Only since 2020, when the COVID-19 pandemic severely impacted the global economy, have new managers noticed the importance of predicting risk as so many businesses have gone bankrupt due to insufficient net cash flows to maintain operations.

About novelty, by inheriting previous research studies, the chosen variables keep their calculation formula and degree of influence while adding some new variables that are suitable for the specific situation of current businesses. Specifically, the variables in the study include 9 variables, including one dependent variable (RR - Bankruptcy Risk) and eight independent variables (CR - Current Ratio, ALR - Asset Liquid Ratio, FL - Financial Leverage, BEP - Basic Earning Power Ratio, WCT - Working Capital Turnover, SALE - Net Revenue, CFA - Operating Cash Flow On Asset, FA - Fixed Asset Ratio). The authors' group used the latest data from financial reports of 60 out of 81 listed real estate businesses in Vietnam during the period of 2011 – 2021, and the authors' group chose to use high-precision STATA 15 software to reflect the effectiveness of risk management and contribute to making the study more accurate and effective.

In fact, there have been many research studies on the topic of bankruptcy risks of different types of businesses in various fields. However, the topic of "Research the factors affecting the risk of bankruptcy of the real estate enterprises listed on the Vietnam stock market" is a new and not extensively researched one. The research work of this author group will solve the above problem.

## **3. RESEARCH METHOD**

### **3.1. Research model**

Based on foreign research and domestic research, this research focuses on the impacts of 8 factors which lead the risk of bankruptcy of the real estate enterprises: Current Ratio (CR), Asset Liquid Ratio (ALR), Financial Leverage (FL), Basic Earning Power Ratio (BEP), Working Capital Turnover (WCT), Net Revenue (SALE), Operating Cash Flow On Asset (CFA), Fixed Asset Ratio (FA). In this research, the Model is applied to the Logit model (or also known as Binary Logistic) and STATA 15 software. The group of authors collects data and uses Microsoft Excel to calculate financial ratios which come into being financial indicators: Net Working Capital (NWC), Return On Asset (ROA), Difference between Total Assets and Total Liabilities (CL). Therefore, three financial indicators create one dependent variable which is a binary variable, named RR - Bankruptcy Risk, with only two values, (0 - business is not at risk of bankruptcy; 1 - business is at risk of bankruptcy). Regarding the general model:

**Table 3.1: The definitions and describes of variables in model**

Variable names	Formula	Hypothesis
Current ratio (CR)		inversely proportional
Asset liquid ratio (ALR)		directly proportional
Financial leverage (FL)		directly proportional
Basic earning power ratio (BEP)		inversely proportional
Working capital turnover (WCT)		inversely proportional
Net revenue (SALE)	Net revenue	inversely proportional
Operating cash flow on asset (CFA)		inversely proportional
Fixed Asset Ratio (FA)		directly proportional

Source: The group of authors created

### 3.2. Research data

In the Vietnam market, 81 real estate enterprises are listed on stock exchanges. In fact, there are enterprises that lack data, so the group of authors chooses 60 businesses to research during the period 2011 - 2021. The percentage of 60 businesses is large, at 70.07%. The research model includes 8 independent variables and 1 dependent variable. According to the Logit model. The data is collected from various real estate business's financial statements in the State Securities Commission of Vietnam between 2011 - 2021 that are significant transparency.

**Table 3.2: The percentage of the real estate enterprises listed on Vietnam stock market**

Stock exchange	Number of business	Percentage
HNX	18	30.00%
HOSE	42	70.00%
Total	60	100%

Source: The group of authors created

## 4. RESULTS AND DISCUSSION

### 4.1. Results

#### 4.1.1. Stopping test

The Levin-Lin-Chu (2002) standard is used to test the stationarity of variables in the model with respect to table data. The stopping test is to avoid tampering in the regression model, to ensure that all variables considered are stop variables. The test results with the significance level of 1%, all data sequences in the study sample are stopped sequences.

**Table 4.1: Testing table for Stopping**

Variables	Levin-Lin-Chu test		Results
	t-Statistic	P-Value	
CR	-15.9028	0.0000	STAND
ALR	-10.6759	0.0000	STAND
FL	-9.4336	0.0001	STAND
BEP	-11.3513	0.0011	STAND
WCT	-2.1e+02	0.0000	STAND
SALE	-9.1115	0.0158	STAND
CFA	-21.8377	0.0000	STAND
FA	-14.8394	0.0000	STAND

Source: The group of authors created

Table 4.1 shows that all tested variables have t-statistic < 0. In particular, all CR, ALR, FL, BEP, WCT, SALE, CFA, FA variables have a P-value of less than 1%, which explains, the variables are stationary with a significance level of 5% in the given author group model.

**4.1.2. Descriptive Statistical Analysis**

Conduct data analysis of variables in the descriptive statistics table.

**Table 4.2: Results of descriptive Statistical tests**

variable	N	mean	sd	min	max	cv
rr	660	.1984848	.3991616	0	1	2.011043
cr	660	2.414094	2.70396	.226823	30.73874	1.120073
alr	660	3.175278	8.108136	.164716	141.4402	2.55352
fl	660	.5274858	.3436401	.00707	6.071059	.6514679
bep	660	.0536163	.069	-.357725	.479492	1.286922
wct	660	.9206095	88.92572	-1314.35	1762.987	96.5944
sale	660	5.38e+11	1.33e+12	-9.54e+10	2.36e+13	2.473166
cfa	660	.0300969	.1267346	-.470525	.888517	4.210886
fa	660	.0701138	.1354921	6.00e-06	.888657	1.932461

Source: Group of authors calculated on STATA 15 software

Through the statistical table describing the variables, the study had 660 observations. The indicator is statistically described as a risk assessment index through the above indicators, the results of this RR indicator are described as fluctuating from 0 to 1, the average result is 0.198 a large number with a range of above fluctuations, finally the standard deviation of this variable is 0.399.

**4.1.3. Correlation Coefficient analysis**

Correlation coefficient is a measure of the degree of linear correlation between two variables. In principle, correlation will find a line that best matches the linear relationship between the two variables. The correlation coefficient takes the value from -1 to +1. The greater the correlation coefficient is, the closer the relationship between the two variables is shown.

**Table 4.3: Correlation Coefficient test results**

	rr	cr	alr	fl	bep	wct	sale	cfa	fa
rr	1.0000								
cr	-0.2159	1.0000							
alr	0.1170	0.0379	1.0000						
fl	0.0752	-0.1299	-0.2381	1.0000					
bep	-0.2421	0.1006	-0.0110	-0.0625	1.0000				
wct	-0.0358	-0.0008	-0.0062	0.0181	-0.0484	1.0000			
sale	0.0614	-0.0946	-0.0573	0.1141	0.0087	0.0292	1.0000		
cfa	0.0001	0.0367	-0.0238	0.0027	0.2188	-0.0789	0.0535	1.0000	
fa	0.1025	0.2027	0.0414	-0.0683	-0.0018	-0.0565	-0.0948	0.1007	1.0000

Source: Group of authors calculated on STATA 15 software

From the results of Table 4.3, it shows that the dependent variables have a negative correlation with CR, BEP, WCT variables and have a positive correlation with ALR, FL, SALE, CFA, FA variables.

**4.1.4. Checking for Multicollinearity**

When the authors examined the multicollinearity phenomenon in the model, the VIF coefficient of fluctuations was between 1.01 and 1.09 with an average of 1.06. According to Hoang Trong and partners

(2008),  $VIF < 7$  will not have multicollinearity. From the test results obtained on the model, it is concluded that the model does not have multicollinearity.

Variable	VIF	1/VIF
fl	1.09	0.916518
cr	1.07	0.931996
cfa	1.07	0.933328
bep	1.07	0.937227
fa	1.07	0.937556
alr	1.06	0.940850
sale	1.03	0.969596
wct	1.01	0.989023
Mean VIF	1.06	

**Table 4.4: Multicollinearity Test Results**

Source: Group of authors calculated on STATA 15 software

#### 4.1.5. Testing the Predictability of the model

Initially, tests were carried out to choose which of the two FEM and REM models is the most suitable. The model estimation results by both Logit FEM and Logit REM methods are statistically significant with the study sample. Use the Hausman test to choose between FEM or REM models.

**Table 4.5: Hausman test results**

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fell	(B) rell		
cr	-.6169442	-1.038676	.4217319	.
alr	.1481908	.1937484	-.0455576	.0097528
fl	.8284421	.8818253	-.0533831	.1639681
bep	-4.95161	-8.490394	3.538784	.3684145
wct	-.0012835	-.0013852	.0001016	.
sale	7.92e-14	8.72e-14	-8.03e-15	3.64e-14
cfa	1.49981	.8137204	.6860892	.
fa	3.873272	2.642629	1.230643	.9696111

b = consistent under Ho and Ha; obtained from xtlogit  
B = inconsistent under Ha, efficient under Ho; obtained from xtlogit

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)' [(V\_b-V\_B)^(-1)] (b-B)  
= 9.19  
Prob>chi2 = 0.2393  
(V\_b-V\_B is not positive definite)

Source: Group of authors calculated on Stata 15 software

The P-value estimation results of the Hausman test corresponding to the model by 0.2393 are greater than 5%, so the REM model will be more suitable than the FEM model.

According to the selected REM Logit model, the results indicate that independent variables with  $P > |z|$  less than 5% significance level will be selected into the most optimal model.

The test results showed that there are 5 independent variables (CR, ALR, FL, BEP, FA) that are statistically significant with dependent variables (RR).

Optimal Model:

$$\ln_i \left[ \frac{P(RR = 1)}{1 - P(RR = 1)} \right] = \beta_1 + \beta_2 CR_i + \beta_3 ALR_i + \beta_4 FL_i + \beta_5 BEP_i + \beta_6 FA_i + \varepsilon_i$$

Remove non-statistical variables from the model and continue to estimate the model using the Logit REM model to produce the optimal model results.

**Table 4.6: Results of running the complete REM model**

```

Iteration 0: log likelihood = -246.02848
Iteration 1: log likelihood = -243.55522
Iteration 2: log likelihood = -243.49535
Iteration 3: log likelihood = -243.49518
Iteration 4: log likelihood = -243.49518

Random-effects logistic regression
Group variable: id

Random effects u_i ~ Gaussian

Integration method: mvaghermite

Log likelihood = -243.49518

Number of obs = 660
Number of groups = 60

Obs per group:
    min = 11
    avg = 11.0
    max = 11

Integration pts. = 12

Wald chi2(5) = 53.51
Prob > chi2 = 0.0000
    
```

rr	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cr	-1.090521	.1935464	-5.63	0.000	-1.469865	-.7111769
alr	.1955458	.0514724	3.80	0.000	.0946617	.2964298
fl	.8536053	.4069879	2.10	0.036	.0559238	1.651287
bep	-7.941176	2.418983	-3.28	0.001	-12.6823	-3.200057
fa	2.633566	1.02635	2.57	0.010	.6219569	4.645176
_cons	-.6942616	.463212	-1.50	0.134	-1.60214	.2136172
/lnsig2u	-.0848338	.46033			-.9870639	.8173964
sigma_u	.9584701	.2206063			.6104664	1.504857
rho	.2182863	.0785495			.1017517	.4077074

LR test of rho=0: **chibar2(01) = 16.78** Prob >= chibar2 = 0.000

Source: Group of authors calculated on Stata 15 software

Table 4.6 results show that the model consists of 5 variables: Current Ratio (CR), Asset Liquid Ratio (ALR), Financial Leverage (FL), Basic Earning Power Ratio (BEP), Fixed Asset Ratio (FA) affect the risk of bankruptcy with a significant level of 5%. In particular, CR, BEP have a negative impact and ALR, FL, FA have a positive impact on the bankruptcy risk of the studied real estate business enterprises. The influence of all five variables is exactly the same as the original hypothesis on economic theory mentioned above.

#### 4.1.6. Testing the predictability of the model

The research results show that in 8 independent variables according to the initial hypothesis that have an impact on the bankruptcy risk of the listed real estate business on the market studied, there are 5 actual variables that have an impact, creating the optimal model as above and in line with the hypotheses as well as those previously pointed out by previous studies: Current Ratio (CR), Asset Liquid Ratio (ALR), Financial leverage (FL), Basic Earning Power Ratio (BEP), Fixed Asset Ratio (FA) on the Logit model to connect the dependent variable is the bankruptcy risk of the enterprise.

Forecasting on the REM logit model after excluding non-affected factors has the following results:



**Table 4.7: Classified test results**

Classified	Model 1		
	1	0	Total
1	17	114	131
0	4	525	529
<b>Total</b>	<b>21</b>	<b>639</b>	<b>660</b>
<b>Sensitivity</b>	<b>12.98%</b>		
<b>Specificity</b>	<b>99.24%</b>		
<b>Rate of type I error</b>	<b>0.76%</b>		
<b>Rate of type II error</b>	<b>87.02%</b>		
<b>Correct classification</b>	<b>82.12%</b>		

Source: Self-calculating group of authors

Using the REM Logit model with Classification testing to forecast the possibility of bankruptcy risk of listed real estate enterprises in Vietnam. From the table above, the fixed-impact REM model indicates 82.12% accuracy classification; Type I and Type II violations are 0.76% and 87.02%, respectively. The forecast results also show that the Logit REM model has a forecast rate of real estate businesses with a risk of bankruptcy of 12.98%, businesses without a risk of bankruptcy is 99.24%.

## 4.2. Discussion

### 4.2.1. Group of variables that have a similar impact on the bankruptcy risk of the enterprise

ALR: The Asset Liquid Ratio has a favorable effect on the bankruptcy risk of the enterprise, which means that when the enterprise increases the overall solvency ratio, it will cause financial risk to increase, leading to the potential for bankruptcy risk to increase. As the overall solvency of the business increases, so does the total assets of the large business. This is a big disadvantage for a real estate business. Because at that time, the inventory of the enterprise is too large to be liquidated, the contracts have not been implemented, the unfinished projects are not completed or there is not enough capital to operate and complete... will bring difficulties to the enterprise in terms of capital, thereby causing obstacles and risks of bankruptcy of the enterprise. Research has shown to support the views of Vo (2020), Simantinee & Phani (2015), Vu (2017)..

FL: Financial Leverage is a combination of equity and loans from banks or financial institutions to increase profit margins for businesses. The financial leverage ratio is one of the business levers that shows the correlation between loan capital and equity. Leverage represents the level of debt utilization in the firm's total capital. The low index shows that investors have the ability to be financially self-reliant, whereas investors have not used the advantages of this tool effectively. Since then, it has been found that financial leverage is proportional to the risk of bankruptcy. Research has shown that it has added correctness to the views of Vo (2020), Vu (2017)...

FA: The Fixed Capital Ratio has a positive impact on the bankruptcy risk of the enterprise. Real estate businesses often invest in high fixed assets while the fixed capital of the business is often low liquidity, the capital turnover of enterprises with long cycles is partly rotated, each stage of the business cycle. Therefore, when the revenue of the real estate business is not enough to offset the fixed costs, it will increase the risk of bankruptcy of the business when it fails to pay its debts in time. This is also consistent with the research hypotheses of the topic and of Gang & Dan (2012), Vu (2017)...

### 4.2.2. Group of variables that have the opposite impact on the bankruptcy risk of the enterprise

CR: Current Ratio has the opposite impact on the bankruptcy risk of a real estate business enterprise. According to the inspection results, the higher the current solvency of the enterprise, the lower the risk of

bankruptcy of the enterprise and the inability to bankruptcy, and vice versa, if the current solvency of the enterprise is low, the risk of bankruptcy of the enterprise will increase. Current solvency relates to whether the business can pay its short-term debts or not, reflecting the financial capacity to handle current debts, contributing to reducing the risk of bankruptcy due to current debts. Therefore, the CR will be opposite to the bankruptcy risk of the enterprise. The results of this study are also in line with the expectations of the author and it is supported by some authors, such as: Gang et al. (2012), Bhunia and Mukhuti (2012), Simantinee and Phani (2015).

BEP: The Basic Earning Power Ratio has the opposite impact on the risk of bankruptcy of real estate enterprises listed on the Vietnam stock exchange. This means that as the economic rate of return of an enterprise's assets increases, the risk of bankruptcy decreases. This variable has a positive impact because when the enterprise improves the rate of return of assets, it will contribute to increasing equity, promoting investment and development, increasing the size, expanding market share and at the same time increasing the ability to pay debts, which means the risk of bankruptcy of the enterprise decreases. This study also supports the view of economists such as Altman (1968), Gu (2002).

#### **4.2.3. Some solutions and recommendations**

*The first is the group of direct solutions:*

Through the results of studying econometric models, the author proposes solutions to reduce financial risks in real estate enterprises. One of the important solutions is to improve the efficiency of financial analysis, including increasing the use of econometric models to clarify the influence of factors on analytical indicators, helping businesses have a scientific basis to offer specific solutions to improve financial management.

*Solutions related to Financial Leverage:* Enterprises need to have a capital structure and use reasonable financial leverage to improve profitability. In particular, enterprises need to set out a specific strategy on the use of financial leverage to improve profitability as follows: there should be a flexible policy in the process of using debt, limiting the use of debt to finance short-term assets when they have not fully exploited their performance; It is necessary to be flexible in the use of capital funding sources, specifically in the period of unstable lending interest rates in the market, in addition to limiting debt borrowing, enterprises can use other forms of capital mobilization such as issuing more shares to employees and strategic investors.

*Solutions related to Current Ratio:* A difficult problem is always set for managers and executives of enterprises that always have reasonable strategies to balance the current solvency (CR) of enterprises, develop and occupy the legal business capital of partners but must ensure to maintain the ability to pay, well control the financial situation in order to avoid falling into insolvency and falling into bankruptcy. A scale of real estate business with appropriate capital structure: reducing short-term liabilities and increasing investment in current assets. Enterprises will promote their strengths to improve the profitability of capital, maintain the reputation and brand of the business, accelerate the speed of inventory turnover, and reduce debt recovery time.

*Solutions related to Asset Liquid Ratio such as:* Strengthening the organization of receivable debt management; Regularly monitoring and managing receivables that have arisen, urging customers to pay debts on time; Take measures to prevent and control the arising of outstanding debts; Ensure a reasonable cash reserve level to meet payment requirements; Adjust the capital structure in a reasonable manner in the direction of increasing the proportion of equity in total capital.

*Solutions related to Fixed Asset Ratio such as:* identifying and maintaining a reasonable asset structure; choosing an appropriate form of capital mobilization; there are times when it is necessary to invest in fixed assets but the financial ability does not allow or consider the investment ineffective, the company should consider the form of financial lease and vice versa; Enterprises need to have a reasonable asset structure orientation, especially the issue of investment and use of fixed assets, thereby increasing the efficiency of management, use and new investment in fixed assets, liquidation of outdated, obsolete, low productivity assets...

*Solutions related to Basic Earning Power Ratio.* Businesses need to pay attention to expanding the size of their businesses, expanding and developing more areas of operation; build trust, maintain and develop the number of customers, increase competitiveness in the market and need to have a flexible policy in the process of using debt.

*Next is the group of complementary solutions:*

Enterprises need to build a competitive strategy; restructure corporate governance; rationally and effectively use financial analysis tools; and finally, real estate businesses need to have a plan and goals that are consistent with their capacity.

*The authors also made some recommendations as follows:*

The State needs to study and gradually improve the synchronous and transparent legal system in real estate, especially the renovation of financial policies on the real estate market. The Ministry of Planning and Investment must improve the quality of land use planning and real estate development investment planning. The State should create a mechanism to strongly attract investment capital, build real estate business with State budget sources or with investment capital of credit institutions.

The State Bank needs to use flexible monetary and financial policies to ensure that it does not create bubbles but also does not tighten causing stagnation and market freeze. It is necessary to form credit forms related to real estate and there should be solutions for foreign investors not only to invest in cash flow, but to combine business - investment - management - marketing projects. The State Bank needs to regularly check and supervise the credit granting situation of credit institutions, and control negative phenomena.

Stock exchanges need to create a safe, transparent and liquid investment environment for investors; always stick to the principles of effective governance and orientation to improve modern technology development, in addition, it is necessary to promote and be more transparent with information.

## **5. CONCLUSION**

*Firstly*, the project has systematized in detail the general reasoning about the risk of bankruptcy and bankruptcy risk analysis. The research has built a system of risk analysis of enterprises in a complete and comprehensive way.

*Secondly*, the work has pointed out and analyzed the research of some countries around the world on the analysis of bankruptcy risk of real estate enterprises. Through studying the experience of some countries, the study has pointed out the lessons that real estate businesses listed on the stock exchange of Vietnam can apply in the current context. This is an important premise to build, orient and develop listed real estate enterprises in Vietnam in the coming time.

*Thirdly*, the study surveyed and analyzed financial statements and information related to 60 listed real estate enterprises in Vietnam to show the overall picture of the bankruptcy risk situation of listed real estate enterprises from 2011 to 2021. The results of the analysis have shown that the risk of bankruptcy of real

estate businesses in Vietnam is still inadequate, reflected in the main points: business efficiency decreases; profitability, solvency is still unstable. The study points out factors that affect the profitability of enterprises including size, asset growth rate, operating profitability, debt ratio, while factors affecting the bankruptcy risk of enterprises include financial leverage, solvency, financing policy, profitability.

*Fourthly*, based on the analysis of the current situation of bankruptcy risk, the research has proposed groups of solutions to improve the risk of bankruptcy of enterprises in the real estate business. Some direct solutions include: current solvency solutions, general solvency solutions, solutions related to financial leverage, solutions related to the economic rate of return of total assets. In addition, some complementary solutions include: building a competitive strategy, restructuring corporate governance, increasing the use of financial analysis tools and restructuring governance in enterprises.

*Fifthly*, in order for the solutions to be put into practice, the study has proposed many policy recommendations to the Government, ministries, departments, branches and management agencies in order to create favorable conditions for business activities of enterprises. Hopefully, with the participation of the whole political system, the proposed solutions will have application conditions and practical results, contributing to improving the financial situation of real estate businesses. With the results of the study, the research has contributed more evidence and supplemented the research on the risk of bankruptcy of listed real estate enterprises in Vietnam.

## 6. APPENDIX

**Table 1: List of Real Estate Enterprises listed on Vietnam Stock Market**

STT	Mã	Sàn giao dịch	Tên doanh nghiệp
1	API	HNX	Công ty cổ phần Đầu tư Châu Á - Thái Bình Dương
2	BAX	HNX	Công ty cổ phần Thống Nhất
3	BCE	HOSE	Công ty cổ phần Xây dựng và Giao thông Bình Dương
4	CCL	HOSE	Công ty cổ phần Đầu tư và Phát triển Đô Thị Dầu khí Cửu Long
5	CDC	HOSE	Công ty cổ phần Chương Dương
6	CIG	HOSE	Công ty cổ phần COMA 18
7	CKG	HOSE	Công ty cổ phần Tập đoàn Tư vấn Đầu tư Xây dựng Kiên Giang
8	D11	HNX	Công ty cổ phần Địa ốc 11
9	D2D	HOSE	Công ty cổ phần Phát triển Đô thị Công nghiệp số 2
10	DIG	HOSE	Tổng Công ty cổ phần Đầu tư Phát triển Xây dựng
11	DRH	HOSE	Công ty cổ phần Xây dựng Thương mại Căn Nhà Mơ Ước
12	DTA	HOSE	Công ty cổ phần Đệ Tam
13	DXG	HOSE	Công ty cổ phần Tập đoàn Đất Xanh
14	FLC	HOSE	Công ty cổ phần Tập đoàn FLC
15	HAR	HOSE	Công ty cổ phần Đầu tư Thương mại Bất động sản An Dương Thảo Điền
16	HDC	HOSE	Công ty cổ phần Phát triển Nhà Bà Rịa Vũng Tàu
17	HDG	HOSE	Công ty cổ phần Hà Đô
18	HLD	HNX	Công ty cổ phần Đầu tư và Phát triển Bất động sản HUDLAND
19	HQC	HOSE	Công ty cổ phần Tư Vấn - Thương Mại – Dịch Vụ - Địa ốc Hoàng Quân
20	HU1	HOSE	Công ty cổ phần Đầu tư và xây dựng HUD1
21	HUT	HNX	Công ty cổ phần Tasco
22	ICG	HNX	Công ty cổ phần Xây dựng Sông Hồng

23	IDV	HNX	Công ty cổ phần Phát triển Hạ tầng Vinh Phúc
24	IJC	HOSE	Công ty cổ phần Phát triển Hạ tầng Kỹ thuật
25	ITA	HOSE	Công ty cổ phần Đầu tư và Công nghiệp Tân Tạo
26	ITC	HOSE	Công ty cổ phần Đầu tư và Kinh doanh Nhà
27	KBC	HOSE	Tổng Công ty Phát triển Đô thị Kinh Bắc
28	KDH	HOSE	Công ty cổ phần Đầu tư và Kinh doanh Nhà Khang Điền
29	L14	HNX	Công ty cổ phần LICOGI 14
30	LGL	HOSE	Công ty cổ phần Đầu tư và Phát triển Đô thị Long Giang
31	LHG	HOSE	Công ty cổ phần Long Hậu
32	NBB	HOSE	Công ty cổ phần Đầu tư Năm Bảy Bảy
33	NDN	HNX	Công ty cổ phần Đầu tư Phát triển Nhà Đà Nẵng
34	NHA	HOSE	Tổng Công ty Đầu tư Phát triển Nhà và Đô thị Nam Hà Nội
35	NLG	HOSE	Công ty cổ phần Đầu tư Nam Long
36	NTL	HOSE	Công ty cổ phần Phát triển Đô thị Từ Liêm
37	PDR	HOSE	Công ty cổ phần Phát triển Bất động sản Phát Đạt
38	PTL	HOSE	Công ty cổ phần Victory Capital
39	PV2	HNX	Công ty cổ phần Đầu tư PV2
40	PVL	HNX	Công ty cổ phần Đầu tư Nhà Đất Việt
41	QCG	HOSE	Công ty cổ phần Quốc Cường Gia Lai
42	RCL	HNX	Công ty cổ phần Địa ốc Chợ Lớn
43	SCR	HOSE	Công ty cổ phần Địa ốc Sài Gòn Thương Tín
44	SDU	HNX	Công ty cổ phần Đầu tư Xây dựng và Phát triển Đô thị Sông Đà
45	SGR	HOSE	Công ty cổ phần Tổng CTCP Địa ốc Sài Gòn
46	SIC	HNX	Công ty cổ phần ANI
47	SJS	HOSE	Công ty cổ phần Đầu tư Xây dựng và Phát triển Khu công nghiệp Sông Đà
48	SZB	HNX	Công ty cổ phần Sonadezi Long Bình
49	SZC	HOSE	Công ty cổ phần Sonadezi Châu Đức
50	SZL	HOSE	Công ty cổ phần Sonadezi Long Thành
51	TDC	HOSE	Công ty cổ phần Kinh doanh và Phát triển Bình Dương
52	TDH	HOSE	Công ty cổ phần Phát triển Nhà Thủ Đức
53	TIG	HNX	Công ty cổ phần Tập đoàn Đầu tư Thăng Long
54	TIP	HOSE	Công ty cổ phần Phát triển Khu Công nghiệp Tín Nghĩa
55	TIX	HOSE	Công ty cổ phần Sản xuất Kinh doanh Xuất nhập khẩu Dịch vụ và Đầu tư Tân Bình
56	VC3	HNX	Công ty cổ phần Tập đoàn Nam Mê Kông
57	VC7	HNX	Công ty cổ phần Tập đoàn BGI
58	VPH	HOSE	Công ty cổ phần Vạn Phát Hưng
59	VRC	HOSE	Công ty cổ phần Xây lắp và Địa ốc Vũng Tàu
60	VIC	HOSE	Công ty cổ phần Tập đoàn Vingroup

**Table 2: Testing table for Stopping**

Levin-Lin-Chu unit-root test for <b>cr</b>		
Ho: Panels contain unit roots		Number of panels = 60
Ha: Panels are stationary		Number of periods = 11
AR parameter: <b>Common</b>		Asymptotics: <b>N/T -&gt; 0</b>
Panel means: <b>Included</b>		
Time trend: <b>Not included</b>		
ADF regressions: 1 lag		
LR variance: <b>Bartlett</b> kernel, 7.00 lags average (chosen by <b>LLC</b> )		
	Statistic	p-value
Unadjusted t	-15.9028	
Adjusted t*	-8.9765	0.0000
Levin-Lin-Chu unit-root test for <b>alr</b>		
Ho: Panels contain unit roots		Number of panels = 60
Ha: Panels are stationary		Number of periods = 11
AR parameter: <b>Common</b>		Asymptotics: <b>N/T -&gt; 0</b>
Panel means: <b>Included</b>		
Time trend: <b>Not included</b>		
ADF regressions: 1 lag		
LR variance: <b>Bartlett</b> kernel, 7.00 lags average (chosen by <b>LLC</b> )		
	Statistic	p-value
Unadjusted t	-10.6759	
Adjusted t*	-4.1548	0.0000
Levin-Lin-Chu unit-root test for <b>fl</b>		
Ho: Panels contain unit roots		Number of panels = 60
Ha: Panels are stationary		Number of periods = 11
AR parameter: <b>Common</b>		Asymptotics: <b>N/T -&gt; 0</b>
Panel means: <b>Included</b>		
Time trend: <b>Not included</b>		
ADF regressions: 1 lag		
LR variance: <b>Bartlett</b> kernel, 7.00 lags average (chosen by <b>LLC</b> )		
	Statistic	p-value
Unadjusted t	-9.4336	
Adjusted t*	-3.7617	0.0001
Levin-Lin-Chu unit-root test for <b>bep</b>		
Ho: Panels contain unit roots		Number of panels = 60
Ha: Panels are stationary		Number of periods = 11
AR parameter: <b>Common</b>		Asymptotics: <b>N/T -&gt; 0</b>
Panel means: <b>Included</b>		
Time trend: <b>Not included</b>		
ADF regressions: 1 lag		
LR variance: <b>Bartlett</b> kernel, 7.00 lags average (chosen by <b>LLC</b> )		
	Statistic	p-value
Unadjusted t	-11.3513	
Adjusted t*	-3.0676	0.0011
Levin-Lin-Chu unit-root test for <b>wct</b>		
Ho: Panels contain unit roots		Number of panels = 60
Ha: Panels are stationary		Number of periods = 11
AR parameter: <b>Common</b>		Asymptotics: <b>N/T -&gt; 0</b>
Panel means: <b>Included</b>		
Time trend: <b>Not included</b>		
ADF regressions: 1 lag		
LR variance: <b>Bartlett</b> kernel, 7.00 lags average (chosen by <b>LLC</b> )		
	Statistic	p-value
Unadjusted t	-2.1e+02	
Adjusted t*	-2.2e+02	0.0000

Levin-Lin-Chu unit-root test for <b>sale</b>		
Ho: Panels contain unit roots		Number of panels = 60
Ha: Panels are stationary		Number of periods = 11
AR parameter: <b>Common</b>		Asymptotics: <b>N/T -&gt; 0</b>
Panel means: <b>Included</b>		
Time trend: <b>Not included</b>		
ADF regressions: <b>1 lag</b>		
LR variance: <b>Bartlett</b> kernel, 7.00 lags average (chosen by <b>LLC</b> )		
	Statistic	p-value
Unadjusted t	-9.1115	
Adjusted t*	-2.1504	0.0158
Levin-Lin-Chu unit-root test for <b>cfa</b>		
Ho: Panels contain unit roots		Number of panels = 60
Ha: Panels are stationary		Number of periods = 11
AR parameter: <b>Common</b>		Asymptotics: <b>N/T -&gt; 0</b>
Panel means: <b>Included</b>		
Time trend: <b>Not included</b>		
ADF regressions: <b>1 lag</b>		
LR variance: <b>Bartlett</b> kernel, 7.00 lags average (chosen by <b>LLC</b> )		
	Statistic	p-value
Unadjusted t	-21.8377	
Adjusted t*	-11.2120	0.0000
Levin-Lin-Chu unit-root test for <b>fa</b>		
Ho: Panels contain unit roots		Number of panels = 60
Ha: Panels are stationary		Number of periods = 11
AR parameter: <b>Common</b>		Asymptotics: <b>N/T -&gt; 0</b>
Panel means: <b>Included</b>		
Time trend: <b>Not included</b>		
ADF regressions: <b>1 lag</b>		
LR variance: <b>Bartlett</b> kernel, 7.00 lags average (chosen by <b>LLC</b> )		
	Statistic	p-value
Unadjusted t	-14.8394	
Adjusted t*	-6.8033	0.0000

Table 3: Test of REM Logit model

Iteration 0:	log likelihood = -244.26973		
Iteration 1:	log likelihood = -241.63755		
Iteration 2:	log likelihood = -241.57749		
Iteration 3:	log likelihood = -241.57738		
Iteration 4:	log likelihood = -241.57738		
Random-effects logistic regression		Number of obs =	660
Group variable: <b>id</b>		Number of groups =	60
Random effects $u_i \sim$ <b>Gaussian</b>		Obs per group:	
		min =	11
		avg =	11.0
		max =	11
Integration method: <b>mvaghermite</b>		Integration pts. =	12
Log likelihood = -241.57738		Wald chi2(7) =	.
		Prob > chi2 =	.

rr	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cr	-1.038676	.1964753	-5.29	0.000	-1.423761	-.6535916
alr	.1937484	.0516302	3.75	0.000	.0925551	.2949417
fl	.8818253	.421871	2.09	0.037	.0549733	1.708677
bep	-8.490394	2.480766	-3.42	0.001	-13.35261	-3.628182
wct	-.0013852	.0010791	-1.28	0.199	-.0035002	.0007299
sale	8.72e-14	8.84e-14	0.99	0.324	-8.60e-14	2.60e-13
cfa	.8137204	1.015562	0.80	0.423	-1.176745	2.804186
fa	2.642629	1.046426	2.53	0.012	.5916708	4.693587
_cons	-.8695738	.4887507	-1.78	0.075	-1.827507	.0883599
/lnsig2u	.0398776	.443031			-.8284472	.9082023
sigma_u	1.020139	.2259766			.6608532	1.574757
rho	.240312	.0808807			.1171919	.4298054

LR test of rho=0:  $\text{chibar2}(01) = 13.35$  Prob >=  $\text{chibar2} = 0.000$

**Table 4: Test of FEM Logit model**

Iteration 0: log likelihood = -145.95084  
 Iteration 1: log likelihood = -141.93049  
 Iteration 2: log likelihood = -141.86716  
 Iteration 3: log likelihood = -141.86706  
 Iteration 4: log likelihood = -141.86706

Conditional fixed-effects logistic regression      Number of obs      =      418  
 Group variable: id      Number of groups      =      38

Obs per group:  
    min =      11  
    avg =      11.0  
    max =      11

Log likelihood = -141.86706      LR chi2(7)      =      51.40  
    Prob > chi2      =      0.0000

rr	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
cr	-.6169442	.1898901	-3.25	0.001	-.9891219	-.2447664
alr	.1481908	.0525432	2.82	0.005	.0452079	.2511736
fl	.8284421	.4526153	1.83	0.067	-.0586676	1.715552
bep	-4.95161	2.507973	-1.97	0.048	-9.867148	-.0360721
wct	-.0012835	.0009658	-1.33	0.184	-.0031765	.0006094
sale	7.92e-14	9.56e-14	0.83	0.408	-1.08e-13	2.66e-13
cfa	1.49981	.9714681	1.54	0.123	-.404233	3.403852
fa	3.873272	1.426588	2.72	0.007	1.077211	6.669333

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## SUSTAINABLE GROWTH OF SOME DAIRY INDUSTRY JOINT STOCK COMPANY LISTED IN VIETNAM

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**Mentor: Ph.D. Pham Thi Van Anh<sup>1</sup>**

**ABSTRACT:** *This study clarifying the rationale for sustainable growth in dairy enterprises. Simultaneously, find out the status of sustainable growth in dairy enterprises listed on Vietnam's stock market from the years 2018 to 2021, from which to draw assessments and comments. Lastly, proposing solutions to ensure sustainable growth in dairy companies listed on Vietnam's stock market in the coming time.*

**Keywords:** *Sustainable growth, dairy industry, Vietnam's joint stock company.*

### 1. INTRODUCTION

The world is developing rapidly thanks to efforts to reform and apply scientific and technological achievements, but it is facing many problems such as widening gap between rich and poor, environmental pollution, climate change. ...Part of the cause of these problems is also caused by development. Therefore, prosperous growth coupled with environmental sustainability and social inclusion are the main pillars of developed and developing countries, including Vietnam. Therefore, sustainable growth is always one of the biggest challenges of any business leader. To do that, businesses must create long-term value from their available resources. Regardless of the nature of the industry, operations and organizational structure of the business, all must follow this rule for sustainable growth.

Vietnam's milk and dairy products manufacturing and processing industry in recent years has had a dynamic development, providing a variety of products for the national economic life, meeting domestic demand. , gradually replacing imported dairy products and participating in exports with a variety of models and types. In addition, the industry has made significant contributions to the state budget, creating many jobs for workers, contributing to ensuring people's lives and stabilizing the social situation, becoming an important link of Vietnamese agriculture.

Fast economic growth, a large market and an open and attractive investment environment are favourable conditions for the development of the dairy market in Vietnam. Besides these favourable conditions, Vietnam's dairy industry also faces many challenges such as food safety and hygiene, milk quality, husbandry techniques, technological lines, costs as well as policies and incentives from the State. The investment and development of the dairy industry has created favourable conditions for enterprises to develop production with low labour costs and at the same time provide livelihoods for people who are underemployed and have low income, contributing to hunger eradication and poverty alleviation, social security, linking business interests with the community. Due to being in the group of essential products, despite the gloomy business years of enterprises in the entire economy, listed companies in the dairy industry still maintained strong double-digit growth. However, risks in the industry include higher-than-expected

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input material prices and a longer-than-expected Covid-19 pandemic leading to supply chain, distribution and transportation disruptions. This shows that the growth of many dairy businesses has not yet ensured sustainability. Stemming from this fact, the authors have chosen the topic: “Sustainable growth of listed dairy companies in Vietnam” as their scientific research topic.

## 2. THEORETICAL FRAMEWORK:

### 2.1. Definition of sustainable growth:

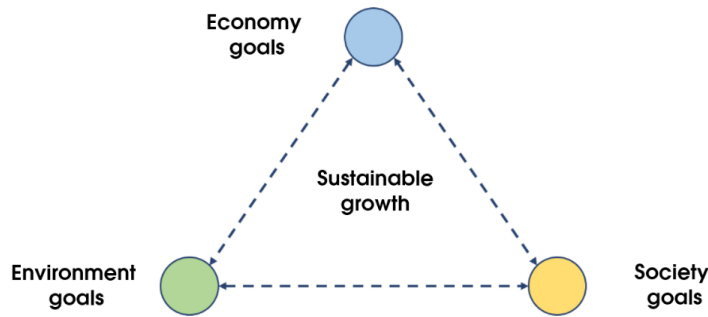
Growth is an economic term that refers to the increase in the amount of wealth that the economy of a business, a country or region, and the globe has acquired over a certain period of time. The commonly used criterion for measuring growth is the rate of increase in the size of gross product in terms of fixed prices. However, if only the goal of quantitative growth is pursued, it can lead to a situation where there is growth without development due to depletion of resources and unfair treatment of different groups of people. Economic development is the transformation of the national economy by an increase in production and an increase in the standard of living of the population. In other words, economic development implies growth and improvement of the living conditions of the population not only economically, but also culturally and socially. Sustainable growth of enterprises is set out within the framework of General Sustainable Growth, taking into account the characteristics of enterprises that are both an economic entity independent of other economic sectors of the locality and an area of concentrated industrial production with high density with metabolic relationships with other sectors of the economy, residential communities and the environment. In this topic, Sustainable growth of enterprises is to ensure continuous, stable and long-term high economic growth of enterprises themselves, enterprises rationally and efficiently use resources, contributing to the implementation of social responsibility and environmental protection inside and outside enterprises.

### 2.2. Sustainable growth models of businesses:

Sustainable growth is a method of socio-economic development that addresses the relationship between economic growth, social problems and environmental protection with the aim of better meeting the needs of the current generation while not hindering the meeting of the needs of future generations. In other words: it is the harmonious development of economic, cultural, social and environmental aspects in enterprises that constantly improve the quality of human life. This perspective can be expanded upon with three basic components of sustainable growth that can be illustrated in the following patterns:



**Model 2.1. Three-circle sustainable growth model**



**Model 2.2. Triangular sustainable growth model**

Model 2.1 and Model 2.2 are widely used in recent sustainable development publications, they have similarities and are collectively called the “three pillars” model because they are both built on the three pillars of sustainable development: economic growth, social justice and environmental protection. However, there are certain differences between these two models: while the three-circle sustainable development model emphasizes that sustainable development necessarily ensures all three objectives: economic, social and environmental, the triangular model emphasizes constraints, dominating and reversibly interacting between three elements: economic goals, social goals and environmental goals for sustainable development.

**2.3. Criteria for evaluating sustainable growth in enterprises**

**2.3.1. Criteria for assessing sustainable economic growth**

The basic measure commonly used to assess sustainable economic growth is the rate of sustainable growth. The sustainable growth rate is understood as the growth rate of profits and dividends to current owners that the business generates that does not originate from external capital. In other words, it is to get profit growth rates and dividends to owners without taking on additional new debt and without raising additional equity from outside. The sustained growth rate is also known as the current owner-to-equity growth rate, which is generated from an additional increase in equity but this capital is formed from reinvested retained earnings.

The formula for calculating the sustainable growth rate is as follows:

$$\text{Sustainable growth rate (g)} = \text{Rate of retained earnings reinvested} \times \text{Return on Equity}$$

**2.3.2. Criteria for assessing social sustainable growth**

Sustainable social growth in enterprises means ensuring fair, humane treatment, respect for human rights in enterprises and participating in social responsibility for localities. Indicators related to labour regime such as salary, bonus, allowance, insurance and labour contract are basic indicators in the CSI Index.

- The level of contribution to society and community
- Ensuring the interests of employees in enterprises
- Creating job opportunities for employees
- Taking care of employees’ health

### **2.3.3. Criteria for evaluating environmentally sustainable growth**

Environmentally sustainable growth requires enterprises to practice measures to minimize the impact of environmental pollution, create an environmentally friendly workspace right in the enterprise. This criterion is shown on the following aspects:

- Comply with Vietnamese laws on environmental protection
- Pollution prevention, troubleshooting, environmental improvement
- Protection of natural resources and environment

### **2.4. Factors affecting sustainable growth in dairy enterprises**

There are many factors affecting sustainable growth in dairy enterprises. In each region, each locality, due to different characteristics, the impact and influence of factors are also different. However, in general, sustainable growth in dairy enterprises is influenced by the following groups of factors:

- Financial management mechanism of enterprises
- Strategic planning and production and business planning activities and selection of investment strategies
- Governance level of enterprises, levels of production organization
- Incentive mechanisms and material responsibilities in enterprises
- Labour and labour quality in the dairy industry
- Science and technology level
- Management capacity, State Administration
- Stable Political
- Legal Environment
- Stable Macroeconomic Environment
- Culture
- Natural Conditions
- Competitors

### **3. RESEARCH METHOD:**

The methodology of dialectical materialism and historical materialism of Marxism-Leninism is uniformly used in the research process of the authors' team. The authors use statistical methods, analysis, synthesis, statistics, comparison, evaluation, description, and cause-and-effect identification as a basis for research. On the basis of aggregation, comparison, analysis,... primary data, methods of description, identification of cause and effect, the topic provides a comprehensive view of sustainable growth in dairy joint stock companies listed on the Vietnam stock market.

### **4. RESULTS AND DISCUSSION**

Dairy enterprises in Vietnam play an important role in socio-economic development. In this chapter, the authors learn an overview of the dairy industry in Vietnam such as: history of establishment and development; basic characteristics of the industry; learn about the research sample as well as an overview of the financial situation of dairy enterprises listed on the Vietnam stock market over the past time. The authors delve into the situation of sustainable growth in dairy enterprises listed on the stock market in Vietnam on

three contents: sustainable economic growth; socially sustainable growth and environmentally sustainable growth. On that basis, the authors make general assessments of sustainable growth in dairy enterprises listed on the stock market in Vietnam from 2018 to now in the following aspects: achievements, limitations and causes of limitations. This is an important basis for the authors to build a system of solutions to ensure sustainable growth in dairy enterprises listed on the Vietnamese stock market in the coming time.

## 5. CONCLUSION

Sustainable growth in enterprises is to ensure continuous, stable and long-term high economic growth of enterprises themselves, enterprises to rationally and effectively use resources, and contribute to realizing social responsibility and environmental protection inside and outside enterprises. This is an issue that attracts the attention of not only businesses, economic managers, economic researchers but also business-related subjects. The topic has gone into depth to give an overview of enterprises in the dairy industry from which to learn about sustainable growth in dairy enterprises. From the concept as well as the connotation of sustainable growth in enterprises, the authors have presented sustainable growth models in enterprises and proposed three groups of criteria for evaluating sustainable growth in enterprises. That is: Criteria for assessing sustainable growth in terms of economy, society and environment. Sustainable growth in dairy enterprises is a broad and complex category, so there are many factors affecting the sustainable growth of enterprises.

Dairy enterprises in Vietnam play an important role in socio-economic development. Currently, sustainable growth in dairy enterprises listed on the stock market in Vietnam has a number of issues that need attention. The topic has evaluated a number of advantages and limitations on the situation of sustainable growth in dairy enterprises listed on the stock market in Vietnam in the period from 2018 on the content and according to the evaluation criteria of the sustainable growth in enterprises. The study has pointed out some causes of the above limitations. This is an important basis to help the authors build a system of solutions to ensure sustainable growth in dairy companies listed on Vietnam's stock market in the coming time. The solution system consists of 2 groups of solutions. That is: a group of solutions from businesses and recommendations to the State and authorities. The group of solutions inside enterprises includes 7 solutions: (i) Expanding markets, promoting export activities and researching new products to improve revenue; (ii) Control costs in the process of production and business activities; (iii) Develop a capital financing strategy suitable to enterprises in the dairy industry to increase financial resources; (iv) Increase self-financing capacity, contributing to the restructuring of capital sources; (v) Focus on releasing inventory; (vi) Focus on sustainable social growth; (vii) Concern for environmentally sustainable growth. There are also recommendations to the State and authorities: (i) Renovating thinking, awareness and strengthening education on sustainable growth in general and sustainable growth in enterprises in the dairy industry in particular; (ii) Improve the quality of planning and strengthen the management role of the state in the sustainable growth of dairy enterprises; (iii) Strengthen linkages and coordination among enterprises in the industry; (iv) Solutions for sustainable social growth; (v) Solutions for environmentally sustainable growth. These are basic and important solutions to ensure sustainable growth in dairy enterprises listed on the Vietnamese stock market in the coming time.

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## **SOLVENCY OF THE FOOD AND BEVERAGE INDUSTRY IN THE PERIOD 2012 – 2021**

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**Mentor: PhD. Dao Hong Nhung<sup>1</sup>**

*ABSTRACT: Solvency of a business is not only to show the business's ability to meet liabilities and other financial obligations but also the measure of that company's financial health since it demonstrates the business's ability to manage operation for the foreseeable future. This study is conducted to analyze the solvency of the faculty of food and beverage industry which includes 31 companies posted up in Viet Nam in the time period 2012 - 2021. The results show that:*

*- For short - term solvency: most F&B companies have it greater than 1, but not too high which means that F&B enterprises mainly mobilize capital from owner equity, the liquidity is very good; at the same time, some F&B enterprises have short-term solvency for many consecutive years of less than 1, which means that these enterprises have a risky financing policy, using short-term debt to support long-term assets.*

*- For quick ratio and current ratio: they are high because the F&B industry tends to be stable of the demand for food and beverages is always necessary.*

*Keywords: Solvency; food & beverage; potential finance;....*

### **I. INTRODUCTION**

The food and beverage industry accounts for a very high proportion of the current industries. The growth trend from 2012 to 2025 is predicted to increase by a total of 3.7%. Worldwide, the total F&B market will reach \$8,049 billion in revenue by 2020. According to Alibaba's report, Asia remains the largest consumption market in the world with 6.1% from 2019 to 2025. With more than 38% of the population (620 million or 235 million) engaged in the agri-food sector, the ASEAN F&B industry is making significant achievements for sustainable growth and development, which is expected to increasing productivity and ensuring consumer demand. Under the impact of the severe economic recession in 2011, 2012, 2013 and the subsequent world economic recovery, the Covid pandemic in recent years led to a dizzying change in all aspects of the economy. industries, not just F&B. Facing the global economic recession, rising inflation and problems related to logistics and distribution, businesses quickly adjust their financial policies to adapt to this situation in a timely manner. The shift from traditional merchandise purchases to automated e-commerce, prompt delivery services and incentives have boosted the consumption of beverages as well as food.

### **II. ANALYSIS OF THE SOLVENCY OF THE BUSINESS**

Solvency is the ability to use the resources of an enterprise to respond to the liabilities of the enterprise according to the appropriate time. The ability of a business to pay its debts also reflects the health of a business. A well-run business is certainly financially able to pay its debts.

Solvency analysis helps to assess the ability to convert resources into cash to pay the debts of the enterprise by appropriate time, thereby assessing the financial situation of the enterprise, seeing the potential as well as risks in mobilizing and repaying debts of enterprises.

When analyzing solvency, use the following indicators:

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- Solvency ratio

$$\text{Solvency ratio} = \frac{\text{Total assets}}{\text{Total liabilities}}$$

This indicator shows how many times the enterprise is able to pay its debts by total assets or is 1 dong of liabilities secured by several dong of assets. Normally, this ratio must be greater than 1. When this ratio is less than 1, the total assets are less than the total liabilities or the equity is less than 0 which means that the financial situation of the enterprise is bad, the risk of bankruptcy is very high.

On the contrary, if this ratio is too high, it should be considered, because then enterprises use too much equity leading to high cost of capital, or low level of financial leverage, reducing the ability to amplify your business's ROE or EPS.

- Current ratio

$$\text{Current ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

This ratio shows how many times the business is able to pay current liabilities with current assets. When the current ratio is greater than 1, the enterprise is using a part of non-current assets to finance current assets after financing long-term assets, providing long-term stability and financial safety for businesses, but potentially increasing the cost of capital.

- Quick ratio

$$\text{Quick ratio} = \frac{\text{Current Assets} - \text{Inventory}}{\text{Current Liabilities}}$$

This is a more rigorous assessment of the solvency of the business. Inventory is excluded because in current assets, inventory is considered a less liquid asset class. This ratio indicates the ability of the business to pay current liabilities without having to make urgent liquidation of inventory.

- Cash Ratio

$$\text{Cash Ratio} = \frac{\text{Cash}}{\text{Current Liabilities}}$$

This ratio shows how many times the business is able to pay its current liabilities with its available cash and cash equivalents. This ratio is especially useful to assess the solvency of enterprises in times of economic crisis when inventories are unsold and many receivables are difficult to collect.

### III. ASSESS THE SOLVENCY SITUATION

In general, the liquidity of listed F&B enterprises tended to decrease slightly in the period 2012 - 2016, then fell sharply in the period 2016 - 2017 and remained stable from 2017 to 2021.

The Short-term solvency measures at the end of 2012 was 3.0478 times, before it dramatically collapses to 2.4053 times at the end of 2017, then in 2016 it reached 2.8959 times, increased again at 2.7183 times in 2020 and decreased to 2,5212 at the end of 2021. The Short-term solvency measures sharply decline starting from 2016 - 2019 and jumping again in 2020 is due to the faster growth rate of liabilities, replaced by a decrease in mobilization from owner equity. Before that, from 2012 to 2016 remained at the same level, especially in 2012 reaching 3.0478. The Short-term solvency measures greater than 2 shows that F&B enterprises mainly mobilize capital from owner equity, the liquidity is very good.

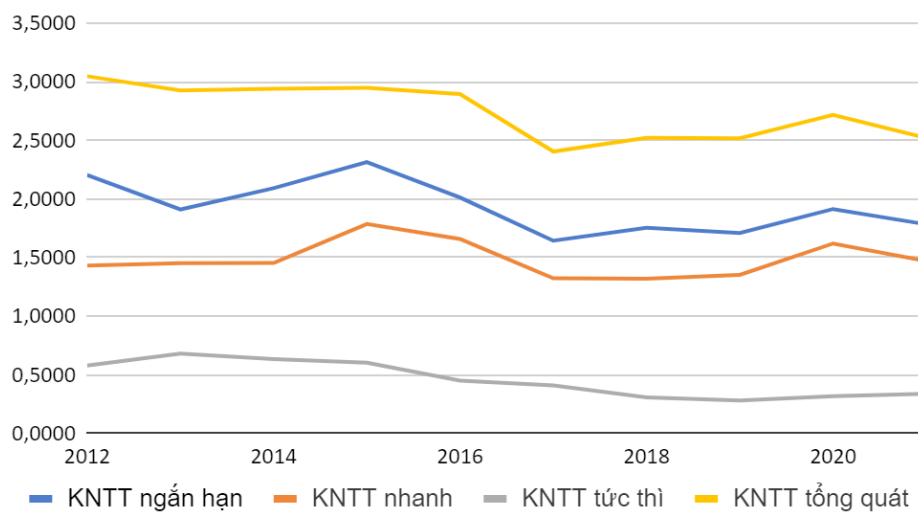
The average short-term solvency of F&B firms fluctuated strongly from 2012 to 2017. In 2012 it decreased from 2,2044 times to 1,9106 times at the end of 2013 and continued to increase to reach 2,3150 times in 2015 but in the next period decreased to 1.6443 times in 2017. Since 2017 – 2021, it has remained stable in the range of 1.6443 – 1.9146 times. Overall, most F&B companies have short-term solvency greater

than 1, but not too high, except for Hanoi - Hai Duong Beer Company and Lam Dong Food Company, which sometimes reached the peak at 6 times. In addition, some F&B enterprises have short-term solvency for many consecutive years of less than 1, which means that these enterprises have a risky financing policy, using short-term debt to support long-term assets.

The average quick ratios of enterprises remained stable from 2012 to 2014 at 1.45 times. From 2014 to 2021, the top out point is 1,7869 times in 2015 and the bottom out point in 2018 is 1,3199 times. The average quick ratios of enterprises is greater than 1, showing that the ability to immediately pay short-term debts of enterprises is at a high level.

The current ratios of F&B enterprises in the period 2012 - 2021 is at a high level of about 0.2 to 0.6 times, showing that the cash reserve is large enough to pay short-term debts. From 2015 to 2019, there is a trend of decrease gradually due to the increase in short-term debt of enterprises, but the amount of cash and cash equivalents does not fluctuate.

The average quick ratios and current ratios of enterprises are high because the F&B industry tends to be stable of the demand for food and beverages is always necessary.



### Solvency of F&B companies listed in Vietnam

Source: Calculation from financial statements of food and beverage companies for the period 2012-2021

Considering each activity array:

For food businesses: The overall solvency coefficient is lower than that of beverage businesses. Most food businesses have an overall solvency of 2 or more and a downward trend from 2012 to 2021 shows that businesses raise more from equity than liabilities. This confirms that food businesses have good debt repayment ability. Regarding the short-term solvency ratio, in most years, most enterprises have this coefficient greater than 1, which means that it ensures the principle of financial balance and relative stability in business activities. However, in contrast to other food businesses, LAF has a short-term solvency of less than 1, which proves that the enterprise cannot afford to pay short-term debts due to importing raw cashew nuts at high prices from abroad but goods cannot be sold.

For beverage companies: Regarding the overall solvency coefficient, all enterprises are greater than 2 except VTL. Most of the enterprises have a high overall solvency ratio, which proves that the enterprises

increase mobilization from equity more than liabilities. Regarding the short-term solvency system, these coefficients are all greater than 2 except for the period from 2017 to 2019. In which, SMB and BHN have short-term solvency ratios of less than 1, showing that enterprises are having policies. venture funding.

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## **EFFECTIVE OF USING THE BUSINESS CAPITAL: A CASE STUDY OF VIETNAM'S LISTED STEEL INDUSTRY.**

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*ABSTRACT: Business capital is a resource that determines the existence and development of an enterprise. The rational use of business capital will help businesses maintain regular production and business, create profitability and preserve capital. The article introduces the effective use of working capital of steel enterprises in Vietnam. The article uses data collected from the financial statements of 14 steel enterprises operating in Vietnam from 2018 to 2022. The efficiency of using business capital is usually shown through the comparative relationship between steel companies. Direct and indirect benefits are obtained from the direct and indirect costs incurred in the course of doing business. If business efficiency is considered as a goal, the efficiency of using business capital is an effective means to achieve that goal. The results of the article are very useful for corporate administrators in general and financial managers, in particular, helping managers make the right financial decisions for the company in order to promote their business efficiency. company.*

*KEYWORDS: efficiency, business capital, steel enterprises.*

### **1. INTRODUCTION**

Working capital is the total amount of money to invest in the input for the production and business process of an enterprise. It is used in the process of production and business activities for the purpose of making profits for business.

The efficiency of using the business capital of an enterprise is an economic category, reflecting the level of exploitation and use of capital of an enterprise in production and business activities in order to achieve maximum profit at the cost of capital. the shortest. The efficiency of using business capital is shown through indicators to evaluate the efficiency of using business capital in enterprises such as: return on working capital (ROA); return on equity (ROE); the ratio of profit after tax to sales (ROS), total capital turnover, etc.

In a market economy, capital will follow the law of supply and demand of the market, from which businesses need to choose an effective investment plan, the required amount of capital and optimal capital attraction. However, effective management and use of capital is the core issue for businesses to maintain business operations, profit growth and development. Therefore, in order to maximize the value of the business and maximize the benefits for the owner, first of all, businesses need to be aware and properly evaluate the use of business capital so that it is effective and sustainable. steady.

Currently, when the Vietnamese economy is gradually walking on the path of integration, the domestic economic sectors are also facing more competition and challenges due to the impact of global issues, especially from the global economy. Covid-19 pandemic. Steel enterprises in Vietnam are no exception. In recent years, listed steel enterprises in Vietnam have developed very rapidly both in terms of number and size of enterprises. However, it can be seen that the financial situation of many enterprises is not really healthy, business performance is unstable and still low. The difficulties of the economy in the past have affected many businesses, causing losses, even falling into bankruptcy.

Steel is not only a construction material but also a staple food of heavy industries and defense. The steel industry has always been identified by the State as a priority industry in the development of the country. The growth of the steel industry always goes hand in hand with the growth of the industry and the economy. In 2022, steel businesses face many difficulties when witnessing a sharp decrease in revenue and profit. Over 50% of enterprises reported losses. This shows that the efficiency of capital use of steel enterprises is at a low level and facing many difficulties and challenges.

Faced with that situation, steel enterprises need to quickly implement solutions to recover their financial situation and increase profits. To be able to improve the efficiency of the working capital of an enterprise, financial managers must design a system of measurement indicators, evaluate the effectiveness of working capital, and understand the mechanism of impact of factors on the efficiency of the enterprise. In order to come up with appropriate solutions to improve the efficiency of working capital. Although there have been many studies on the efficiency of working capital of enterprises in the world, the results of these studies are not really consistent with the situation of Vietnamese steel enterprises in recent years. Therefore, the author writes this article for the purpose of analyzing and finding out the factors affecting the efficiency of working capital and assessing the extent of the influence of those factors on steel enterprises in the past. With the research results, the managers of the steel industry can come up with specific measures to affect each factor to gradually improve the efficiency of capital use, which is an urgent issue for enterprises in particular. In general and of listed steel companies in Vietnam in particular.

## **2. LITERATURE REVIEW AND HYPOTHESIS**

### **2.1. Literary magazine**

Khatab et al. (2011) test the relationship between corporate governance quality and business performance of the company through ROA, ROE and Tobin' Q coefficients with explanatory variables as financial leverage, model business and asset growth rate of 20 companies listed on Karachi Stock Exchange, Pakistan based on data collected from 2005-2009. The research results show that financial leverage and asset growth have a statistically significant effect on ROA, ROE and Tobin's Q, while firm size has no effect on the above criteria. This study shows that the business performance of enterprises is determined by governance policy.

San and Heng (2011) studied 49 construction companies listed on the Malaysian stock market in the period 2005-2008, divided into 3 types of large, medium and small scale. Research results show that for large firms, return on capital to debt per share, market value and earnings per share with long-term debt per share are often positively correlated. While earnings per share and debt to equity are negatively related; only marginal operating profit with long-term debt per share is often positively related in mid-sized firms, and earnings per share with debt-to-equity are negatively related in large firms. Small company.

Pouraghajan and Malekian (2012) studied the impact of capital structure on firm performance with a sample of 400 companies in 12 industries listed on the Tehran Stock Exchange in the years 2006–2010. Using qualitative research methods combined with quantitative methods, the author identifies dependent variables, representing the performance of enterprises - ROA and ROE. Research results show that there is a significant negative relationship between debt ratio and firm performance. Asset turnover, company size, tangible asset structure and growth rate have a positive and statistically significant relationship with the

company's business performance (ROA and ROE). There is no statistical relationship between firm age and firm performance. Firms in the industrial sector such as non-metallic mineral producers, F&B companies, base metals, auto parts and auto parts companies have a negative relationship with firm age, while companies in the materials and chemical industries show a positive and significant correlation between firm age and firm performance.

Saeed et al. (2013) studies and evaluates the impact of capital structure on operational efficiency through ROA, ROE, and EPS with independent variables as short-term debt, long-term debt, total debt on equity and the two control variables are firm size. and the growth rate of total assets of 25 banks listed on the stock exchange of Karachi, Pakistan, based on data collected from 2007 to 2011. The results show short-term debt ratio, total debt and size. firms have the same effect, while long-term debt ratio has a negative effect on ROA, ROE and EPS, while asset growth rate has no effect on ROA and ROE. In addition, there are many other studies on the impact of these factors on business performance of enterprises. However, there has been no research focusing on the factors affecting the efficiency of working capital of Vietnamese steel enterprises in the period 2018-2022. Therefore, this article contributes to help Vietnamese steel enterprises improve the efficiency of using business capital.

## 2.2. Hypothesis

Profit after tax on working capital (ROA): ROA ratio reflects how much profit after tax is generated for each dollar of capital used in the period.

→ Profit after tax on working capital (ROA) = (Profit after tax) / (Average working capital in the period) × 100%.

Return on Equity (ROE): This ratio measures the after-tax profit earned per dollar of equity of the owner during the period.

→ Return on equity (ROE) = (Earnings after tax) / (Average equity) × 100%.

Profit after tax on sales (ROS): This ratio reflects the ability to manage and save costs of the enterprise. This indicator reflects the relationship between profit after tax and net revenue in the period of the enterprise. This indicator shows how much profit a business can earn in a period of revenue.

→ Rate after tax on sales (ROS) = (Profit after tax) / (Net revenue in the period) × 100%.

Total Capital Turnover: This turnover shows how much net sales a business generates in one round of capital.

→ Total capital turnover = (Net revenue) / (Average working capital).

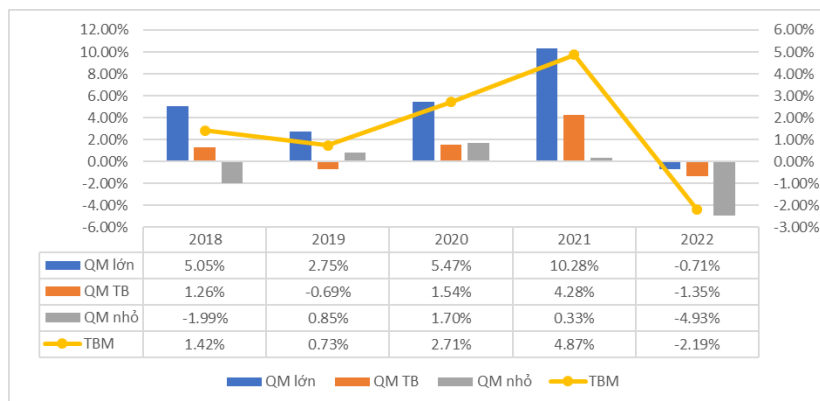
## 3. RESEARCH METHODS

The provided data is collected from audited financial statements of 14 steel industry enterprises listed on HNX and HOSE from 2018 to 2022 on the prestigious website <https://cafef.vn/>; <https://vietstock.vn/>. Companies that publish full and continuous annual financial statements ending on December 31 are the sample selection criteria in this study and in the manufacturing sector companies have not suffered consecutive losses in the period 2018- 2022. Thus, this study has 14 companies \* 5 years = 70 observed variables, which have been processed by Excel. We choose HNX and HOSE because they are two of the leading stock exchanges in Vietnam.

4. RESULTS AND DISCUSSION

4.1. Descriptive statistics

Chart 1: ROS of steel companies by asset size

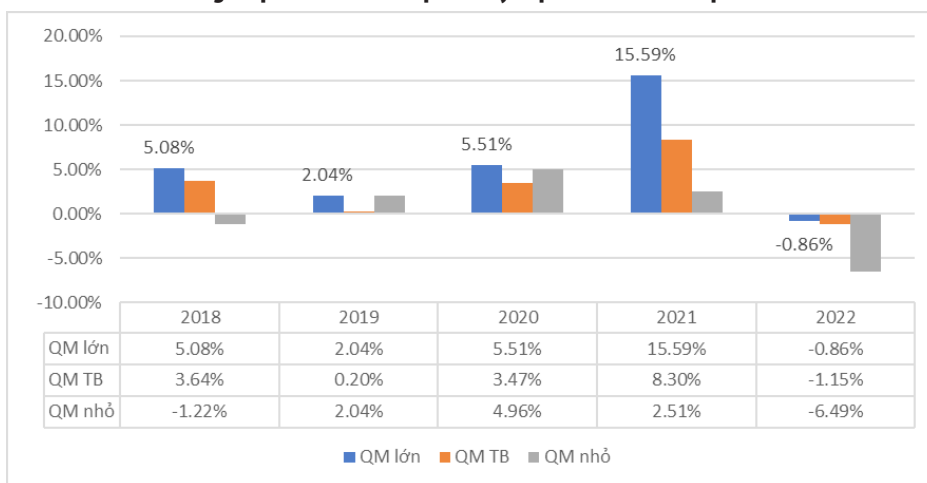


Source: Calculation from financial statements of steel companies in the period of 2018 - 2022

Steel enterprises show great difficulties in generating revenue and controlling costs effectively, especially in 2022. The main reason for the low ROS of steel enterprises is low and volatile. This is because the difference between the selling price of steel and scrap steel for production is low, causing companies to reduce the volume of billet production and increase the volume of billet purchased from outside. In addition, the increase in capacity far exceeds the demand, which makes the price competition in the steel industry increase, along with the negative influence from the price of raw materials, so these companies sometimes have to production cuts. In addition, it is impossible not to mention that the cost management level of the enterprise is still limited. The most significant difference in the sample, where Hoa Phat Steel is assessed as having the ability to generate large and stable revenue and control costs effectively is due to the advantages of scale, business strategy and investment. in a reasonable depth as well as focusing on the application of modern technology, saving energy and renewable energy.

Net Profit to VKD (ROA)

Chart 2: ROA of groups of steel enterprises by capital scale in the period 2018-2022

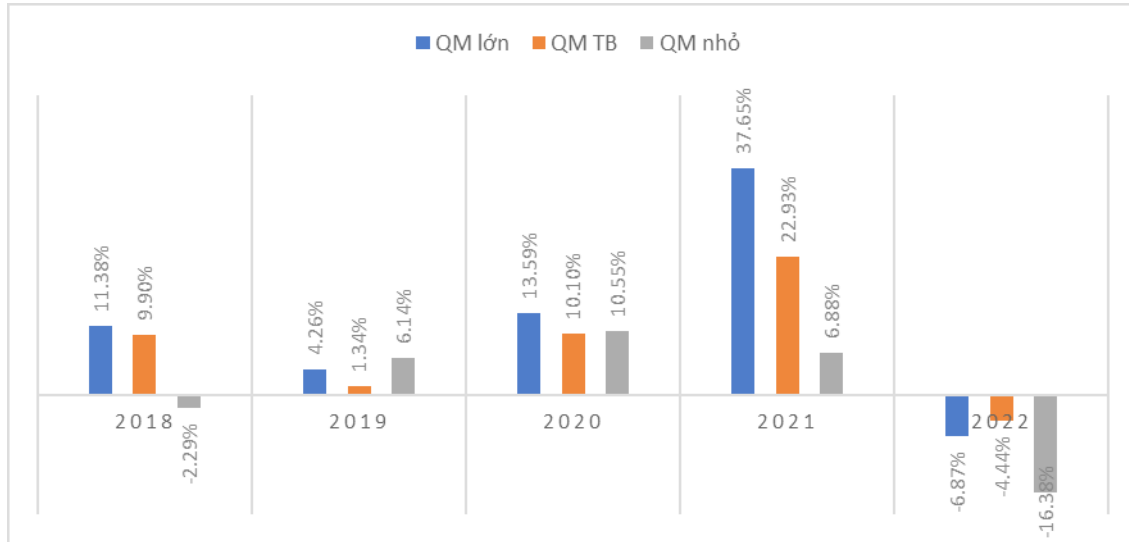


Source: Calculation from financial statements of steel companies in the period of 2018 - 2022

It can be seen that Steel enterprises have low ROA. This is also relevant because activities in the heavy industry sector such as steel and cement often have a very large amount of fixed assets, so the

ROA will be relatively low, which is in stark contrast to other industries. Technology services companies, consumer goods do not need to operate with a large amount of fixed assets, so the ROA of companies in this industry is often high.

**Chart 3: ROE by groups of listed steel companies by capital size**



Source: Calculation from financial statements of steel companies in the period of 2018 - 2022

### ROE of groups of steel enterprises by size:

Similar to profitability indicators BEP, ROA. Enterprises with large capital scale have higher ROE than medium and small sized enterprises in the same period. The difference in ROE in groups of different sizes as well as in each enterprise is very large. This is because ROE depends on many factors, in addition to the general characteristics of the whole industry in certain business contexts, ROE depends on production characteristics and unique factors of each enterprise such as the level of exploitation and use. asset use or level of financial leverage.

Typically, in enterprises with capital scale of over 10,000 billion VND, we can easily see two clear trends in return on equity between enterprises using BOF furnaces (Hoa Phat) and enterprises using furnaces. EAF ( Pomina ).

For long steel enterprises using BOF furnaces, as is typical in the case of Hoa Phat Group, the ROE of this enterprise is high mainly due to its wide operating profitability and high short-term capital turnover. Meanwhile, the company's short-term investment coefficient is relatively low. Hoa Phat in general has large total assets and is in the process of investing in strong assets. Hoa Phat Dung Quat Iron and Steel Complex project with a total investment of VND 52,000 billion has entered the stage of formation and completion, which has significantly increased the value of assets, especially long-term assets. Hoa Phat's profitability comes mainly from operational management and short-term capital management.

Meanwhile, enterprises using EAF furnaces have lower ROE, recording a negative index in 2019-2021 of only about 1-5%. The average short-term capital turnover of 2 rounds and the average leverage of about 2-3 times are at the industry average. However, the net profit margin of this group is very low and this is also the main reason why enterprises using EAF furnaces have low ROE in the steel industry.

Flat steel enterprises have quite high ROE thanks to high leverage, averaging 4 times and short-term capital turnover speed, at 2.5 rounds, although net profit margin is only 1% on average. Return on equity of flat steel enterprises comes mainly from capital mobilization policy as well as short-term capital management level.



To clearly see the factors affecting ROE of steel enterprises, the research team used Dupont -ROE analysis technique.

**Table 1: Dupont analysis - factors affecting ROE of steel enterprises**

	2018	2019	2020	2021	2022
ROE	6.84%	3.54%	11.23%	22.55%	-8.54%
ROS	1.42%	0.73%	2.71%	4.87%	-2.19%
Svq	2.40	2.38	2.25	2.29	2.12
Average debt ratio	0.5	0.51	0.46	0.51	0.46

*Source: Calculation from financial statements of steel companies in the period of 2018 - 2022*

The data table shows that the ROE of steel enterprises is most affected by the ROS factor. The fluctuation of ROE over the years is mainly due to the change in ROS. Vietnamese steel enterprises are also focusing on capital investment, production technology, and increasing production capacity. During the last 5 years, we see that the average efficiency of capital use of steel enterprises has decreased slightly over the years. In 2018, the average total capital turnover of the whole industry was 2.4 rounds per year. In 2022, it will be reduced to 2.12 cycles/year. Regarding the use of financial leverage of Steel enterprises in general, there is flexible fluctuation from year to year in a positive direction. The general trend of Steel enterprises is to reduce debt over the years. from 0.51 to 0.46. In good business years, Steel enterprises increased debt to increase ROE. On the contrary, in a difficult period like 2022, steel enterprises also adjusted their average debt to reduce somewhat the negative impact on ROE.

**In summary :** By looking at the profitability on capital of listed steel companies, we can see that: Most of the listed steel companies in Vietnam have a relatively high ROE compared to manufacturing companies. other. Any enterprise has a reasonable financial structure; know how to use financial leverage flexibly; implement good cost management; Reasonable allocation and use of capital will achieve high ROE or EPS. Businesses with good sales policies and reasonable commercial discount policies will save costs and increase ROE. Enterprises with poor cost management, unreasonable investment and use of capital, and poor financial leverage, have low ROE.

#### 4.2. Result

In terms of business scale: Steel companies constantly invest in expanding business capital scale, raising the average VKD from VND 10,000 billion to VND 18,000 billion. This is an important basis for capital to increase financial potential as well as to meet capital needs for growth.

Regarding the positive business results when the Steel enterprises increased revenue and profit. Although in the period of 2019-2022, Steel enterprises faced difficulties due to the epidemic situation, economic recession and political instability in the world, Steel enterprises still maintained a high revenue growth rate in the period of 2019- 2021 and will hold steady in 2022. Profit accordingly has a strong growth with an average growth rate of 82.67%/year continuously from 2018 to 2021.

In terms of capital allocation and capital mobilization: Steel enterprises mostly have a capital allocation suitable to industry characteristics, on average, current assets account for 72% to 78% of total assets. Large companies in the industry have been pioneering in rational restructuring when investing heavily in fixed assets to increase production capacity and increase initiative in production. In addition, businesses have mobilized a large amount of capital to meet the needs of continuous business, well exploit the capital source and reduce the amount of credit.

The efficiency of capital use of listed steel companies in recent years has been stable and highly effective. Steel businesses have high profitability with a continuous uptrend in the period from 2019-2021.

This is the efforts of enterprises in adapting to the developments of the Covid-19 epidemic as well as receiving favorable conditions from the business environment, in the face of rapid fluctuations in steel prices and the increase in prices of steel products. export value. In the context of the economic recession, it is the fact that steel enterprises always maintain the combined efficiency indicators such as BEP, ROS, ROA, ROE at high and stable levels. This shows the great efforts and efforts of the leadership and management team of the steel enterprise, as well as the collective employees in the steel enterprise in striving to continuously increase the quantity and quality of products. . . export, meet the strict requirements of the market, conquer difficult markets such as the US, EU, Japan...

#### **4.3. Discuss**

The majority of steel enterprises have business results showing a lack of stability, great dependence on the external environment and competition. The change in steel price and input material costs or export value greatly affects the business results of Steel enterprises in the period. .

The efficiency of using capital of many enterprises is still too low.

The material and technical facilities of enterprises are a factor that greatly affects labor productivity, output, revenue and profits of enterprises. However, at present, there are many steel companies that have not fully exploited their existing production capacity, as shown by the amount of net revenue made per dollar of investment in fixed assets of the company is too low.

The inventory management of some enterprises has not been properly focused, capital is stagnant, and rotation is slow. This clearly reflects the lack of sensitivity in the organization of searching for markets, changing production methods, and lack of flexibility in product consumption policies. These shortcomings need to be remedied soon in the near future.

The level of use of financial leverage is not appropriate: The analysis shows that although Steel enterprises are ensuring their ability to pay interest well, the level of using financial leverage is not reasonable in some enterprises.

Business results and capital efficiency in 2022 decreased sharply and cost control of many steel enterprises was not really good. The analysis shows that the revenue in 2022 has decreased slightly, but the profit after tax of Steel enterprises has decreased dramatically, down to 84% compared to the same period in 2021. The main reason is that the control of costs of enterprises has not been. efficiency, especially cost of capital. Many enterprises have very high cost of goods sold (over 80%). As a result, in 2022, about 50% of Steel enterprises in the sample reported a loss, capital efficiency recorded a negative number.

### **5. PROMOTION PROPOSAL AND CONCLUDE THESIS**

#### **5.1. Promotion proposal**

- Coordinate many measures to maximize existing production capacity, improve efficiency and effectiveness of using fixed capital: strengthen market forecast analysis, organize production flexibly, in line with developments of the market. Steel enterprises are promoting new investment or expanding production, however, enterprises should only invest in the production of product lines that Vietnam has not yet produced, to form a closed production line. Steel enterprises need to continuously improve and innovate to improve productivity, product quality and competitiveness. The association needs to gather steel production and business establishments, create conditions for establishments to unite, support each other, exchange experiences, improve production and business efficiency, and do good work together. construction and development of Vietnam's steel production and trading industry

- Striving to continuously improve the efficiency of using working capital: enterprises need to develop the

input material production industry, reduce dependence on foreign imports, and need to invest in developing the material production industry. , especially materials that are currently imported in large quantities such as iron ore, scrap steel, coking coal, graphite electrodes... Enterprises need to manage receivables in detail according to each customer, strengthen monitor and compare debts with customers, thereby closely monitoring the repayment term of debts to take measures to urge and remind customers when the debt is due for payment so that customers can take the initiative enough money to repay the loan on time. In addition to increasing search for new export markets, steel enterprises need to closely monitor developments in the world and domestic markets to flexibly adjust production plans and develop the most appropriate sales policies.

- Developing a product distribution system, handling inventory steel: To sell goods, businesses need to apply sales discount and payment discount policies to encourage customers to pay early for goods. businesses soon have money to cover the cost of buying raw materials. The Vietnam Steel Association and the Ministry of Industry and Trade cooperate to have better management, direction and assignment solutions in production and business activities. The Ministry of Industry and Trade needs to organize trade promotion activities in domestic and foreign markets, in order to support enterprises to promote their brands, seek to expand markets, link, cooperate, and invest to bring the steel industry to life. breakthrough. production and export strengths. Promote the activities of association, consolidation and merger between domestic steel distributors and foreign enterprises in order to build large and professional enterprises and distributors capable of conquering the market.

- Investment in renewal of production lines, upgrading of specialized machinery and equipment to increase production capacity and save costs: In the context of global integration and fierce competition among enterprises in the domestic market. domestic and international, domestic and foreign, technological innovation, production lines, application of management systems and tools to improve productivity and quality are solutions to help steel enterprises improve productivity, product quality, improve the position, reputation and image of enterprises in the market

## 5.2. Conclusion

Improving the efficiency of capital use is always a topic of great significance in both theory and practice. This is a prerequisite for businesses to survive and develop. The main research results of the topic “Efficiency in using working capital of listed steel companies in Vietnam” are: Systematizing the theory of working capital and efficiency in using working capital of enterprises. Karma; Assessment of the effective use of business capital of 14 steel enterprises listed in Vietnam in the period 2018-2022; Proposing some key solutions to improve the efficiency of using business capital for listed steel enterprises in the coming period, 2023-2025.

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## BUSINESS CAPITAL EFFICIENCY: A CASE STUDY OF THE VIETNAMESE STEEL INDUSTRY

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Nguyen Huy Quoc Anh, Nguyen Huong Mai  
Mentor: Nguyen Thu Ha<sup>1</sup>**

**Abstract:** *This study aims to identify and analyze the impact of internal factors on the business efficiency of steel firms in Vietnam. The article uses data collected from the financial statements of 14 steel firms operating in Vietnam from 2018 to 2022. We apply E-view software in quantitative analysis to build regression models on the table data (panel data), and the study has built a regression model identifying the relationship and impact level of internal factors affecting the business efficiency of steel firms in Vietnam. In the study, the dependent variable is business efficiency, determined by the average amount of working capital and fixed capital of an enterprise.*

*The independent variables are business size, growth rate, liquidity ratios, financial leverage, economic growth, and interbank interest rate. The research results show that the four factors of firm size, and the growth rate of assets have a positive impact on business efficiency, while two factors including payment capacity and financial leverage do not affect the business efficiency of enterprises. The results of this article are very useful for corporate executives in general and for financial managers in particular, helping managers make the right financial decisions for the company to promote the business efficiency of the company.*

**Keywords:** *Steel Firms; Business Efficiency; Capital*

### 1. INTRODUCTION

Business capital is a prerequisite for businesses to be able to carry out their production and business activities. Without capital, there would not be any production and business activities, business capital is the basis for enterprises to calculate and plan business strategies and plans.

Steel is not only a construction material but also a staple food of heavy industries and defense. The steel industry has always been identified by the State as a priority industry in the development of the country. The growth of the steel industry always goes hand in hand with the growth of the industry and the economy. In 2022, Steel enterprises face many difficulties when witnessing a sharp decrease in revenue and profit. Over 50% of enterprises reported losses. This shows that the efficiency of capital use of steel enterprises is at a low level and facing many difficulties and challenges.

Therefore, the analysis and evaluation of the effectiveness of using business capital to proactively take appropriate solutions to improve the efficiency of capital use is an urgent issue for enterprises in general and for enterprises in the industry. listed steel in Vietnam in particular.

### 2. LITERATURE REVIEW

Many studies have been carried out to find and study the factors that affect steel firms' business capital efficiency. Despite all efforts to investigate factors that the construction business capital efficiency influenced by some researchers.

**R Azhagaiah, C Gavoury (2011)** examined eight companies working in the basic material sector in Saudi Arabia during the period 2009 to 2018. The results show that the long-term and short-term

<sup>1</sup> Academy of Finance.

debt ratio shows a negative relationship with profitability while the total debt ratio shows a positive relationship with profitability.

**Zhang Y, Zhang Z (2011)** studied capital structure, corporate governance, and operations of corporate activities in medium-sized listed companies and small based on panel data of 381 companies small and medium-sized companies listed on the stock market shares listed on the Shanghai Stock Exchange and the Shenzhen for domestic investors of China from 2003 to 2009. The study analyzes the influence of structure capital and corporate governance on operations companies and discovered that the general debt structure and performance of listed small and medium listings companies have a negative correlation.

**Ali S. Hassoon (2018)** illustrates the correlation between manpower, project plans, working equipment, and materials, management, and safety with the productivity of steel enterprises. This research concludes that some factors have crucial effects on the productivity of steel companies such as the working environment's safety, working hours, team skills and experiences, and planning the work of the site respectively.

**Adamu Yahaya (2019)** researched 10 Nigerian manufacturing firms in the period from 2011 to 2016 with multiple regression in data analysis. The study concludes that the accounting receivable collection period and cash conversion cycle have a crucial influence on these firms, while the accounts payables payment period was not significant and cannot affect the firm's profitability.

### 3. METHODOLOGY

#### 3.1. Sample and data

The research sample includes data over 5 years (from 2018 to 2022) from 14 steel firms in Vietnam. Data collected come from information on exchanges, securities companies, and data collected directly from companies. These are sources of information are reliable according to the author. The data used in the study are constructed from the financial statements and financial information of firms in the steel industry. The financial statements of these companies are established based on compliance with the Vietnamese accounting standards system and have been audited.

#### 3.2. Research model

##### Overall model:

$$ROE_{it} = f(SIZE_{it}, GROW_{it}, PR_{it}, LR_{it}, GDP_{it}, RATE_{it})$$

In which:

ROE<sub>it</sub>: The business efficiency of enterprise i, measured in the time t

SIZE<sub>it</sub>: The size variable of enterprise i, measured in the time t

GROW<sub>it</sub>: The growth rate of total assets of enterprise i, measured in the time t

PR<sub>it</sub>: The payment capable of the enterprise i, measured in the time t

LR<sub>it</sub>: The financial leverage of the enterprise i, measured in the time t

GDP<sub>it</sub>: The gross domestic product rate according to General Statistics Office, measured in the time t

RATE<sub>it</sub>: The interbank interest rate of the 12-month term, measured in the time t

##### Hypothesis:

Based on theoretical and empirical research on the business efficiency of enterprises, the author has set up 6 assumptions about the factors affecting the business efficiency of steel enterprises in Vietnam as follows:

**Business size:** Measured by the logarithm of total assets. Small businesses often perform poorly in generating revenue (R Azhagaiyah, C Gavoury - 2011). However, as businesses expand, management becomes more difficult and more costly. There will come a time when economies of scale no longer

work, increasing output exceeds market demand, not increasing profits (Goddard et al. - 2005). For Steel enterprises, qualitative analysis shows that the larger the enterprises, the higher the capital efficiency. The hypothesis is as follows:

**H1: Business size is positively correlated with business efficiency.**

**The growth rate of assets, and revenue:** The more assets a firm holds, the more profits it has, and the greater its revenue is likely to generate more profits (Agiomirgianakis et al., 2006; Yazdanfar, 2013). However, some studies have shown that the relationship between growth and profitability is in conflict (Glancey, 1998). To grow, businesses must increase costs. If this increase in costs exceeds the growth rate, it can cause profits to decrease.

For Steel enterprises, increasing revenue is an important basis for increasing profits due to low-profit margins in the industry. The hypothesis is as follows:

**H2: Growth rate is positively correlated with business efficiency.**

**Liquidity ratios:** Measures a business's ability to pay its obligations as they come due. One of the coefficients commonly used to measure current payments. The current ratio assesses the solvency of current assets and liabilities (Sari, 2020). Managers will find the company's performance to be good when the current ratio is high (Rusdin, 2008). However, if this ratio value is too high, it is also not good as it shows a large amount of idle money and reduces the profitability of the money and thus producing a lower return (Subramanyam, 2014). The hypothesis is as follows:

**H3: Liquidity ratios are positively correlated with business efficiency**

**Leverage ratios:** This ratio is used to assess the extent to which company assets are financed with debt (Fraser & Ormiston, 2016; Sajiyah, 2016). In the context of the economic crisis, many companies reduce production activities due to the decline in people's purchasing power, and the performance of business activities decreases. Therefore, during economic crises, companies tend to reduce their debt ratio. For steel enterprises, it is showing that the level of financial leverage is having both positive and negative impacts on businesses. This impact is different in different enterprises, the hypothesis of the correlation between leverage ratios and business efficiency is:

**H4: Leverage ratios are negatively correlated with business efficiency.**

**Economic growth:** Steel production is the input material of the construction industry. The economic development and raise in public investment demand led to an increase in steel manufacturing capacity and production. The hypothesis is as follows:

**H5: Economic growth is positively correlated with business efficiency.**

**Interest rate:** If interest rates tend to increase, businesses have to use capital at a higher cost. Especially for Steel enterprises, the debt ratio is higher than equity. Therefore, the higher the interest rate, the more costs businesses lose. Therefore, capital efficiency will tend to fluctuate inversely with interest rates.

**H6: The interest rate is negatively correlated with business efficiency.**

#### 4. RESULT

Running the model using E – view software, it expressed that:

**Table 1** Interprets the Pearson correlation for the variables used in the regression model which the firm's profitability has a positive relationship with the size growth and the growth rate of enterprises 0.2448 and 0.5285 respectively, negative relationship with the payment capacity and financial leverage -0.0484 and -0.0637 respectively. The positive correlations illustrate that the size growth and growth rate of enterprises improve the firm's profitability and payment capacity and financial leverage downwards the profitability.

	roe	size	grow	pr	lr
roe	1.0000				
size	0.2448	1.0000			
grow	0.5285	0.1987	1.0000		
pr	-0.0484	0.1922	-0.1757	1.0000	
lr	-0.0637	-0.2265	0.0935	-0.7899	1.0000

**Table 2: The Hausman – test is applied.**

For testifying whether the Fixed Effects Model (FEM) model or the Random Effects Model (REM) model is a more suitable model for studying the factors affecting the efficiency of using the working capital of steel enterprises, the authors use the Hausman test.

Test of hypothetical pairs:

H<sub>0</sub>: There is no correlation between FEM and REM (choose the Random Effects Model)

H<sub>1</sub>: If Prob (chi-square) < 0.05, which means there is a correlation between explanatory variables and random components (choose the Fixed Effect Model)

	Coefficients		(b-B) Difference	sqrt(diag(V <sub>b</sub> -V <sub>B</sub> )) S.E.
	(b) fe11	(B) re11		
size	7.70e-10	7.92e-10	-2.17e-11	1.97e-09
grow	.2611003	.2734024	-.0123021	.0222554
pr	-.1462263	-.0581786	-.0880477	.0803243
lr	-.1369535	-.033616	-.1033374	.0772255

b = consistent under H<sub>0</sub> and H<sub>a</sub>; obtained from xtreg  
 B = inconsistent under H<sub>a</sub>, efficient under H<sub>0</sub>; obtained from xtreg

Test: Ho: difference in coefficients not systematic

$$\begin{aligned} \text{chi2}(3) &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\ &= 3.18 \\ \text{Prob} > \text{chi2} &= 0.3647 \end{aligned}$$

From the above model, Prob (chi-square) = 0.3647 > 0.05, which means we accept the H<sub>0</sub> hypothesis and select the Random Effects model.

**Table 3: The Feasible Generalized Least Squares model (FGLS) is applied.**

Cross-sectional time-series FGLS regression

Coefficients: generalized least squares  
 Panels: heteroskedastic  
 Correlation: common AR(1) coefficient for all panels (0.1161)

Estimated covariances	=	14	Number of obs	=	56
Estimated autocorrelations	=	1	Number of groups	=	14
Estimated coefficients	=	4	Time periods	=	4
			Wald chi2(3)	=	182.76
			Prob > chi2	=	0.0000

roe	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
size	6.19e-10	3.50e-10	1.77	0.077	-6.72e-11 1.30e-09
grow	.2964254	.0220101	13.47	0.000	.2532863 .3395644
pr	-.0112694	.0398181	-0.28	0.777	-.0893114 .0667726
lr	-.0347084	.0140906	-2.46	0.014	-.0623256 -.0070913
_cons	.1351862	.0869029	1.56	0.120	-.0351405 .3055128



The growing rate of a total asset has a positive correlation with the profitability of enterprises. This variable is the most influential one to profitability. If GROW increases by 1%, ROE will increase by 0.296%. This correlation means enterprises with more asset turnovers than average have a greater possibility of enduring macro impacts and solving financial risks.

Besides, the payment capacity and financial leverage are negatively correlated with profitability. If LR increases by 1%, ROE will decrease by 0.035%. During 2018 – 2022, steel enterprises were facing considerable difficulties and many of them used financial leverage to decrease expenses. However, if the financial leverage is overused, the company's profit will not be enough to compensate for the high level of interest expenses. **5. Discussion and recommendations**

### **5.1. Discussion**

We focus on the observed variables of factors in the research model that affect the business capital efficiency of steel production companies in Vietnam:

First of all, steel firms need to take advantage of the business size and the growth rate of total assets in order to improve their business capital efficiency. Enterprises with larger sizes and more asset turnovers are more capable of handling financial risks and are more profitable.

Additionally, the solvency factor has a negative impact on the efficiency of the enterprise's working capital. With high solvency, businesses tend to borrow less and use less debt. On the contrary, when enterprises use high financial leverage, their solvency will be low, pushing up ROE, thereby increasing the use of debt will increase ROE. From there, orienting to use financial leverage appropriately and effectively for enterprises in the steel industry.

Moreover, the results found above indicate that the steel production company in Vietnam needs to be aware of the role of capital structure for business efficiency. Currently, the debt capital of these companies accounts for billions of a relatively high proportion of the total capital (nearly 50%) and the research results show that the level of leverage used has a negative impact on the performance of the business. As leverage ratios are negatively correlated with business efficiency, steel firms should consider choosing the appropriate level of financial leverage by reducing the debt ratio in the company's capital structure.

Finally, since the growth variable has a positive correlation to business capital efficiency. Vietnamese steel firms' managers should also focus on market development, and promote consumption to increase revenue: exploit the domestic market and export markets regional & internationally.

### **5.2. Recommendations**

From the discussion, some recommendations can be made to help steel enterprises improve their business capital efficiency as follows:

#### **Recommendation on firm size and asset growth rate**

According to a survey by Vietnam Report, the reasons firms assess factors that contribute the most to the growth rate in the past 5 years (2018–2022) are due to the growth of the domestic and regional markets. Next is the development of new product lines; expansion of existing markets; development of new market segments with ready-made and cost-competitive skilled labor. Steel firms need to diversify their products, develop new product lines, and expand existing markets, develop new market segments.

#### **Recommendation on financial leverage**

To improve and take advantage of the financial leverage, the Vietnamese steel firms should seek the optimal structure of capital for their business to make a profit from the loans they made. They may also increase the speed of working capital has the effect of reducing the need for capital, hence firms are not

under the pressure to borrow for investment activities as well as to settle debts such as suppliers' debts, and bank loans. Determining the funding sources: determining which business activities the enterprise's internal capital cannot meet or if borrowed capital will bring higher profits to make reasonable decisions. In addition, firms need to reduce short-term loans and utilize long-term loans.

## 6. CONCLUSION

The research has many limitations that have not been overcome. The scope of the research sample is small and there are still many limitations that make the obtained results incomplete and not highly accurate. The research variable can only address a part of the entire steel business market and need to include more featured macro variables of the industry.

In summary, the article has studied the factors affecting the business efficiency of steel firms in Vietnam through data collected from 14 steel firms in the period 2018-2022. The empirical model shows the correlation between internal factors and business efficiency, including firm size, the growth rate of assets, liquidity ratios, leverage ratios, and economic growth working in the same direction on business efficiency, while interest rate has a negative effect on the business efficiency of steel firms. The results of this study have provided useful information for steel firms in finding solutions to improve their business efficiency.

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## OVERVIEW OF THE REAL ESTATE MARKET IN VIETNAM

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**ABSTRACT:** *The Vietnamese real estate market has been growing rapidly in recent years. The study is conducted to analyze Vietnam's real estate in the period 2014–2022. Through the analysis of practical issues, the topic has pointed out the advantages as well as the remaining limitations of the real estate market. In addition to the achieved results, the real estate market still has many limitations, such as commodity prices that fluctuate between hot and cold, speculation, and corruption, to name a few. The real estate market is still inadequate, such as in terms of limitations in planning, limitations in inspection, examination, and handling of violations in the market, and lack of mayor support services.*

**Keywords:** *real estate market; Ho Chi Minh city; Ha Noi; Features.*

### 1. INTRODUCTION

Along with the development of the economy, the real estate market is increasingly expanding and developing. The real estate market has become one of the most important components of the market economy. The birth and development of the real estate market have made significant contributions to the socio-economic development of each country, including Vietnam. Vietnam is a country with a rapidly growing economy, and the real estate market is no exception. It is home to more than 96 million people and is expected to have a population of more than 100 million by 2025. This population growth has led to an increase in demand for housing, commercial real estate, and infrastructure. infrastructure.

### 2 OVERVIEW OF VIETNAM'S REAL ESTATE MARKET

#### 2.1 Features of Vietnam's real estate market

The real estate market in Vietnam has the following characteristics:

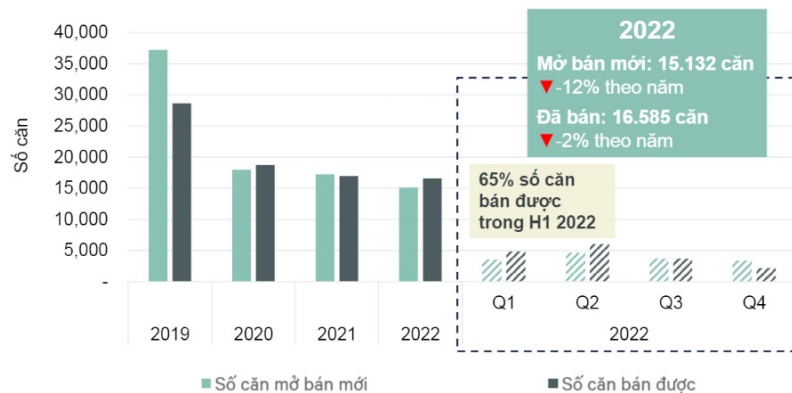
Firstly, real estate prices, especially housing prices, are always at a high level and are complicated and difficult to control, which is a big challenge for market management as well as efforts to solve housing problems for people. low-income subjects. The price movement is extremely complicated; it no longer depends solely on the supply-demand relationship like other commodities, but the price is pushed up thanks to crowd investment psychology, foreign exchange rate fluctuations, and the political policy of pumping and withdrawing money from the state bank. According to a report by the Ministry of Construction, housing prices in Hanoi and Ho Chi Minh City have increased. Ho Chi Minh City increased sharply in the first quarter of 2022. in the city. In Hanoi, apartment prices increased by 1.53%, individual housing increased by 2.24%, and ground land for housing construction increased by 2.85%. in the city. In Ho Chi Minh City, apartments increased by 2.48%, individual housing by 2%, and land for housing construction increased by 3.6%. The uptrend slowed down and showed signs of slowing down at the beginning of the second quarter of 2022, with the participation of local governments and ministries. However, real estate prices do not seem to show any signs of slowing down but fluctuate in an upward direction, continuously establishing new price levels.

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Secondly, the real estate market has developed in terms of quantity, quality, scale, and scope. The real estate market segments are increasingly active, in which the new urban housing market, apartments, and offices for rent are the most visible and vibrant segment in recent years. However, the supply of apartments in Hanoi’s market has continuously decreased in the past 3 years. According to CBRE’s report, the total new supply in Hanoi in 2022 decreased by 12.3% compared to the same period in 2021, reaching about 15,100 units. In particular, in the coming time, the level of new sales in 2023 is expected to decrease slightly or be equivalent to the opening level of 2022, which is expected to reach about 14,000–16,000 units.

**Table 2.1: Number of newly opened and sold apartments in Hanoi from 2019 to 2022**



Source: CBRE

Thirdly, the real estate market occupies an increasingly important position in the economy, with investment projects of increasing quantity and quality. According to the Hanoi People’s Committee, currently in the city, there are 219 investment projects to build houses and urban areas under the Hanoi Housing Development Plan for the 2021–2025 period. Among those projects are 140 commercial housing projects in urban areas, equivalent to nearly 41.5 million square meters of residential floor and 221,507 apartments; 48 projects of social housing, housing for workers, corresponding to nearly 2.9 million square meters of housing floor and 3,900 apartments; 21 resettlement housing projects with about 817,700 square meters of floor space and 10,232 apartments; and 10 projects to renovate and rebuild apartment buildings.

Fourthly, the structure of the real estate market is not yet complete; many market factors are still spontaneously forming (such as the mortgage market, real estate bonds, etc.). Supply and demand in the market are always in a state of huge imbalance in both type and quantity. Experts say that the real estate market in Ho Chi Minh City is strong. The supply-demand gap in Ho Chi Minh City last year was quite serious; almost all projects moved to the higher price segment. Specifically, in 2019, about 30% of the supply was in the high-end, luxury segment; by 2022, this figure will be 75%. While mid-end and affordable projects are increasingly “absent” from the market. In addition, the widespread speculation has increased virtual demand, pushing real estate prices in many areas higher than reality; “underground” transactions also account for a large proportion. This situation in the real estate market not only causes a loss of tax revenue for the state but also contributes to limiting the number of successful transactions. In addition, information about real estate is incomplete, lacking in transparency, and difficult to access. The procedures in real estate transactions are still complicated, have to go through many intermediary stages, take a lot of time, and have high transaction costs. The rights and obligations of the parties involved in the transaction are not guaranteed, and there is a phenomenon of fraud in business and real estate brokerage services...

Fifthly, for many years, in Hanoi as well as in major cities in the country, the state of suspended planning and suspended projects has taken place in many places, making it impossible for people to invest in building houses and developing the economy. Over the past time, the Hanoi city's inter-sectoral working group has organized to work with the people's committees of districts and towns to inspect, review, post-audit, and classify projects. In the city, there are more than 700 non-budget projects using land that are slow to deploy, with a total land area of over 5,000 hectares scattered throughout the districts. From works serving the people to even projects located in the city center that are considered "golden land," they all fall into the category of "covering mats." Although this situation has been going on for decades, dealing with suspended projects is not a simple matter.

Sixthly, the investment in and development of social housing has achieved some initial results, but not as expected. According to the general report of the Ministry of Construction, in 2022, the whole country will have completed about 250 projects of social housing in urban areas and housing for industrial park workers, with a construction scale of more than 100,000 units and a total area of about 7,000 square kilometers. 7.79 million square meters of social housing, while the claim is 12.5 million square meters. The land fund for social housing only meets 36.34%.

## **2.1. Overview of developments in the real estate market from 2013 to the present**

### **2.1.1. The period from 2014 to 2018**

2014 is the year with many effective policies aimed at the benefits of customers and investors. These policies directly affect the housing market. The beginning of the recovery phase of the real estate cycle

On July 1, 2014, the amended Law on Land officially took effect, with many new points in land acquisition, land valuation, and land use planning.

According to the report of the Ministry of Construction, the real estate market has started to show signs of recovery since the last months of 2013. In 2014, the market continued to recover positively, as reflected in the increased transaction volume, relatively stable prices, and the continued decrease in inventory of real estate goods. The structure of real estate goods has been shifted in a reasonable direction, more suitable to the needs of the market. Although real estate credit growth is higher than general credit growth, real estate is still an attractive capital channel.

Specifically, in terms of transactions, in the whole year, there were about 11,450 successful transactions in Hanoi (an increase of more than two times compared to 2013), and in Ho Chi Minh City, there were about 10,350 successful transactions (an increase of about 30% compared to 2013). The housing price level is generally stable; in many projects in the period 2011–2013, prices have fallen deeply (over 30%); in the past 12 months, prices have stabilized and have not decreased further. In Hanoi, a number of projects with good locations were completed or were about to be put into use, and prices increased slightly (about 1–2%) compared to 2013. Regarding real estate inventory, as of 15/15, In December 2014, the total value of real estate inventory was about VND 73,889 billion, down VND 20,569 billion (down 21.8%) compared to December 2013 and down VND 54,659 billion (down 42.5%) compared to the beginning of the reporting period in quarter 1 of 2013. In addition, the structure of real estate goods was adjusted reasonably when there were 60 projects registered to convert from commercial housing to social housing nationwide with a construction scale of about 38,897 apartments and 74 projects registered to adjust apartment structure (reduce area) to better suit market demand.

**Table 2.1: Real estate inventory as of November 2014**

Chỉ tiêu	Chung cư (căn)	Giá trị (tỷ đồng)	Nhà thấp tầng (căn)	Giá trị (tỷ đồng)	Tồn kho BĐS giảm so với tháng 12/2013
Cả nước	15.774	24.114	13.058	21.344	17.62%
Hà Nội	1.911	2.136	2.582	7.550	25.32%
TP.HCM	6.618	11.267	716	2.004	14.64%

Source: Ministry of Construction

Notably, real estate credit outstanding as of October 31, 2014 reached VND 299,020 billion, up 14% compared to December 31, 2013, higher than the overall credit growth of the economy (13%).

As a result of the implementation of a credit package of VND 30,000 billion to support social housing, as of December 15, 2014, the total amount of loans committed by 5 banks was VND 9,417 billion, reaching 31.4% (as of June 2014). reached 13.47%; disbursed was VND 4,882 billion, reaching 16.27% (only 7.63 percent in June 2014).

Disbursement speed in the last 6 months of 2014 more than doubled compared to the period from June 2014 and earlier, especially after the Ministry of Construction presided over and coordinated with the State Bank to submit to the Government for promulgation Decree No. Decision No. 61/NQ-CP dated August 21, 2014, amending and supplementing Resolution No. 02/NQ-CP dated January 7, 2013, which expanded the loan object, extended the loan term, At the same time, there are many social housing projects being implemented to create more supply for the market.

The real estate business ranked second in terms of attracting FDI (in 2014, there were 35 newly licensed FDI real estate projects; newly and additionally registered capital reached US\$2,540 million, accounting for 12.6% of total FDI capital; in 2013, there were 23 new projects with registered capital of 757 million USD).

2014 is considered the most exciting year of mergers and acquisitions in the real estate sector ever. Dozens of sales, project transfers, company mergers and acquisitions, and investment cooperations were successfully transacted. In which prominent are large corporations and companies that have successfully acquired many projects such as Novaland, Vingroup, FLC Group, Him Lam, et al. Besides, large foreign corporations are not outside the country, such as Daibiru and Creed of Japan and Beerli Jucker of Thailand.

**Table 2.2: Some real estate projects bought and sold in 2014**

Dự án	Bên mua	Bên bán	Địa chỉ	Quy mô	Giá trị
Metro Cash & Carry	Berli Jucker (Thái Lan)	Metro			877 triệu USD
Corner Stone	Daibiru (Nhật Bản)	Vibank	16 Phan Chu Trinh, HN	15 tầng (mua lại phần văn phòng)	60.1 triệu USD
Thành phố xanh	Vingroup	Hồng Ngân	Mỹ Đình 1	17.6 ha	1.286 tỷ
ION Complex	FLC	Hải Phát	36 Phạm Hùng	5000m2, 500 căn	198 tỷ
The Lanvender	FLC	Falcon	Quang Trung- Lê Trọng Tấn, Hà Đông	41 tầng nổi, 4 tầng hầm	N/A
Skypark Residence	Tcty xây dựng Thanh Hóa	Licogi 16	25D Khu đô thị mới Cầu Giấy	2 tòa 25 tầng	285 tỷ

Source: Ministry of Construction

The reasons for the recovery of the market during this period were as follows: the macroeconomic situation has gradually improved, the production and business activities of enterprises have begun to show signs of

recovery, and the number of enterprises with losses has decreased. reduce; inflation and low bank interest rates contribute to capital inflows into the real estate market; the government has taken measures to positively affect the market, such as loosening legal regulations and implementing support packages; and confidence in the real estate market is recovering. At the same time, the above positive changes are solutions to market problems, according to Resolution 02 of the government associated with the implementation of the national housing development strategy. Besides, customers' confidence in the market has gradually been restored; many people have no longer felt the psychological need to wait for the next price but have instead decided to buy a house.

In the first 6 months of 2015, foreign investors poured more than USD 465 million into the real estate sector, with 11 newly registered projects and 7 capital increase projects. Many experts believe that in 2015, the flow of money from abroad into real estate will increase rapidly due to many open legal policies, especially the opening to foreigners in Vietnam. According to the Foreign Investment Agency, 2015 is also the year many new economic policies in the direction of more openness and openness officially took effect, especially the amendment and supplement of the Law on Real Estate Business and the Law on Investment. In the field of real estate business, Ho Chi Minh City is the province that attracts the most FDI in this field, with more than 190 projects and 13.4 billion USD of investment capital. Hanoi ranked second with 92 projects and 8 billion USD of investment capital. Ba Ria-Vung Tau ranked third with 10 projects and 6.1 billion USD of investment capital. The next provinces are Binh Duong, Quang Nam, Dong Nai, Hai Phong... In December 2015, Hanoi had about 1,600 successful transactions, equivalent to the same period in 2014 but increased by about 3% compared to the previous month. Ho Chi Minh City had about 1,650 successful transactions, an increase of about 3% compared to the previous month and an increase of about 20% over the same period in 2014. Accordingly, for the whole of 2015, Hanoi achieved about 19,300 successful transactions, an increase of about 70% compared to the same period in 2014. Ho Chi Minh City achieved about 18,550 successful transactions, about 82% compared to the same period in 2014.

Vietnam Real Estate Association (VNREA) has announced the "Report on Inventory of the Real Estate Market for the First Six Months of 2016." In Hanoi, there were about 7,800 successful transactions, and in Ho Chi Minh City, there were about 7,500 successful transactions. labour. In June 2016, the amount of real estate inventory decreased by approximately VND 3,000 billion compared to May 2016. Generally, in the first 6 months of 2016, real estate inventory decreased by 13,400 billion VND, equivalent to 26.33%, bringing the total value of real estate inventory nationwide as of the end of June 2016 to about 37,489 billion VND. This value decreased by 1,935 billion VND compared to the same period last year and nearly halved compared to nearly 2 years ago (about 74,000 billion VND in December 2014).

In Hanoi, the value of real estate inventory was about 5,888 billion dong, down 858 billion dong compared to the end of December 2015, a corresponding decrease of nearly 13%. Meanwhile, in Ho Chi Minh City, the value of real estate inventory is currently 6,815 billion VND, down about 3,292 billion VND compared to the end of December 2015. The real estate market has had a positive recovery and has developed quite steadily. However, nationwide property inventories continued to decline, but the rate of decline has slowed. Inventories are mainly land plots in projects far from the center that do not have adequate infrastructure. Currently, the total value of real estate inventory in Hanoi is lower than that of Ho Chi Minh City and is estimated at 927 billion VND.

In 2017, Vietnam's real estate market witnessed a positive development with an increase in apartment transactions and a decrease in real estate inventory.

According to the report of the National Financial Supervisory Commission on the financial market in 2017, the market has not changed much in real estate prices.

Prices increased mainly in the segment of high-end and mid-end apartments. Prices increase from 3–10% for some high-end apartment projects in urban areas with convenient locations, synchronous infrastructure, construction on schedule, reputable investors, sales policies, and promotions that attract the market. Prices of high-end apartments increased the fastest by 7–10%, mid-end apartments increased by 5-7%, and affordable apartments increased by 3-5%. In the domestic market in 2017, the transaction volume increased significantly compared to 2016, the report noted. The high-end and mid-end apartment segments have the highest number of transactions. The number of successful transactions is estimated at 68,000 units.

Meanwhile, the report said that Vietnam's real estate inventory was about VND 25.7 trillion, down 17% compared to December 2016. Hanoi and Ho Chi Minh City continue to be the cities with the largest inventory of real estate, accounting for 40% of the total inventory of the country. inventory.

In 2017, credit to real estate and construction businesses decreased slightly, accounting for 15.8% of total credit. According to CBRE Vietnam's quarterly report on the Hanoi real estate market published on January 4, 2018 in Hanoi, the end of 2017 marked the positive development of the apartment market in Hanoi. In the fourth quarter of 2017, the market welcomed a record 9,500 new apartments, bringing the total new supply in 2017 to 35,000 units, up 16% over the same period last year. This is also the highest number of new apartments entering the market in a year since the last five years. Sources of fresh goods are scattered throughout the districts in the city.

The market witnessed improved infrastructure and suburban expansion, while two new apartment projects hit the market for the first time in Dong Anh district. The mid-end and affordable segments continued to dominate the market with a total of 80% of new supply in 2017.

The Hanoi real estate market had more than 23,000 successful transactions in 2017, an increase of 12% over the same period last year. Although some projects are not located in prime locations, they still achieve good business results thanks to reasonable investment in product development, product design improvement, and the provision of convenient services for residents. people.

In 2017, primary prices in the market increased slightly due to a high supply of new apartments and changes in demand in the affordable segment. The average selling price from developers stood at \$1,344 per square meter, down 2.4% year-on-year.

With the future development of the market and supply in most areas of the city, apartment developers will be under pressure to professionalize their sales teams and perfect their marketing activities. market for greater competitiveness and revenue.

### ***2.1.2. Period from 2018 to the present***

In 2018 and 2019, the market witnessed local land fever in markets such as Phan Thiet, Bao Loc, and Binh Phuoc, causing land prices in these areas to increase 2-3 times within just 3 months. In addition, land prices also increased by 30–50% in developed tourist areas such as Phu Quoc, Da Nang, Nha Trang, Da Lat, et cetera. The reason is due to the behavior of all agents and brokers, who take advantage of information about project investment, planning, etc. to push up land prices in order to gain illicit profits.

By 2019–2021, the COVID-19 pandemic will have a heavy impact on the economy, making the real estate market quiet. In addition to the emergence of a number of luxury apartment segments (Branded Residence) with a relatively high number of transactions, tourism real estate and investment land seem to have few transactions for real estate businesses. conduct sales due to social distancing.



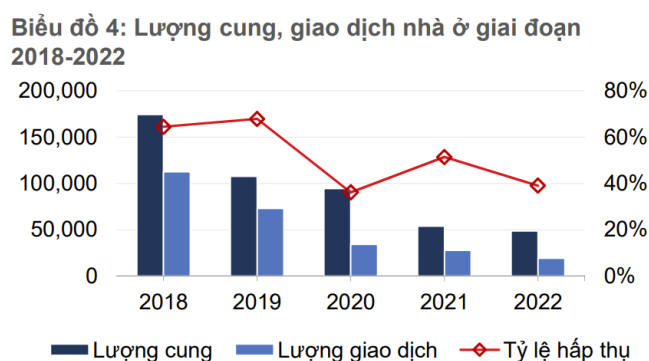
Stepping out of the COVID-19 pandemic, the 2022 real estate market has had many opportunities to recover and develop. The first quarter of 2022 is the clearest example. According to statistics from the Vietnam Real Estate Brokers Association, right from the beginning of the first quarter, the domestic economy has started to maintain its recovery momentum, production activities have been promoted, supply chains have been strengthened, and businesses have been stimulated. In particular, after implementing Resolution No. 128/NQ-CP dated October 11, 2021, on safe, flexible adaptation and effective control of the COVID-19 epidemic and Resolution No. 11/NQ-CP dated October 11, 2021, On January 30, 2022, the government announced the Socio-economic Recovery and Development Program, and most sectors, fields, and localities have entered the trend of recovery and growth again. According to the Report of the First Quarter of 2022 of the Vietnam Real Estate Brokers Association, the business and service industries in general still face many risks, especially after unexpected events in geopolitics and real estate. is still a market attracting significant cash flow.

Real estate has risen to the No. 2 position (in 2021, real estate ranks 3rd), attracting foreign direct investment totaling nearly 600 million USD. The real estate M&A value in the first quarter of 2022 is also the highest in the past 5 years. Specifically, in the first 3 months, real estate businesses spent nearly 1 billion USD to acquire projects, nearly equal to the number recorded throughout 2017 and 2018. In addition, the first quarter of 2022 also witnessed the situation of local land fever in some localities with infrastructure planning information such as airports, industrial parks, bridges, and roads.

From the middle of the second half of 2022, the real estate market began to show signs of calm. A series of tightening policies on credit and corporate bonds and the leaders of some businesses entangled in labor have made the general sentiment in the market afraid; all transactions are delayed, and projects are underway. must press the “pause” button. This situation not only lasted for a month or two but took place throughout the second half of 2022, and later on, the “health” of the market as well as the business community deteriorated. According to the actual survey, many real estate corporations and businesses recorded a sharp decline in profits, even losses; some real estate stocks are “on the floor,” especially because there is a risk of a deep drop in liquidity or possibly a loss of liquidity, as shown by the fact that some businesses are having to take “painful” measures to “exist.”

According to the 2022 real estate market report of the Vietnam Association of Realtors (VARs), the supply of products to the market reached about 48,500, equivalent to about 90% of the total number of products offered for sale in 2021, the year of the market. The market was heavily affected by the COVID-19 epidemic and was only up 28% compared to 2018 (180,000 products).

**Figure 2.2: Housing supply and transactions in the period 2018–2022.**

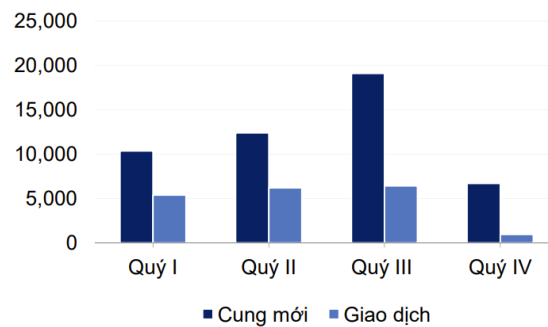


VARIS said that in 2022, the real estate market will rarely have new projects. In the rare number of approved projects, no housing projects appear; only service projects are approved. Therefore, the market lacks housing products that are suitable for the “pockets” of the majority of people.

The supply of high-end apartments increased sharply over the years, while the supply of mid-range and affordable apartments decreased by 90% and 79%, respectively, compared to 2019. Supply recorded the highest level in the land plot segment (accounting for 44%). The future supply will be more and more diversified with the appearance of new real estate products, in line with trends such as healthcare, therapy, medical...

**Figure 2.3: New supply and housing transactions in 2022**

**BIỂU ĐỒ 6: Lượng cung mới, giao dịch nhà ở 2022**



Source: VARIS

The overall consumption rate of the whole market is about 39%, equivalent to 19,000 transactions, or 69% of the consumption in 2021 (about 27,600 products). The total volume of transactions for the whole year decreased by 31% compared to 2021, accounting for only 17% of the transaction volume of 2018, the year before the outbreak of COVID 19.

### About real estate supply

In 2022, the number of newly licensed real estate projects will continue to decrease compared to 2021, making the supply of real estate and housing, especially for low-income people, still limited. as follows:

+ In terms of the number of licensed, ongoing, or completed housing development projects, real estate projects

For commercial housing development projects, the whole country has 126 projects with 55,732 licensed apartments (the number of projects is about 52.7% higher than in 2021); there are 466 projects with 228,029 apartments under construction (equivalent to about 47.7% higher than in 2021); and there are 91 projects with 18,206 apartments completed construction (equivalent to about 55.2% higher than in 2021). shown in the following table:

**Table 2.3: Number of licensed, ongoing, and completed housing development projects and real estate projects**

	Được cấp phép		Đang triển khai		Hoàn thành	
	Số lượng dự án	Quy mô (căn)	Số lượng dự án	Quy mô (căn)	Số lượng dự án	Quy mô (căn)
<b>Quý I</b>	39	18.660	1.216	332.387	22	5.217
<b>Quý II</b>	29	6.753	1.091	327.125	24	5.608
<b>Quý III</b>	36	24.324	1.148	324.511	17	4.123
<b>Quý IV</b>	22	5.995	466	228.029	28	3.258
<b>Cả năm</b>	126	55.732			91	18.206

Source: Ministry of Construction

*For social housing projects, there are nine newly licensed projects nationwide with a scale of 5,526 apartments; 114 projects with 6,196 apartments have completed construction; and there are 27 projects with 8,245 apartments eligible to sell houses in the future, as announced by the Department of Construction.*

*For worker housing projects, there are: 02 newly licensed projects nationwide with a scale of 1,729 apartments; 1 project with 32 apartments completed construction; and 4 projects with 2,328 apartments eligible to sell houses in the future, as announced by the Department of Construction.*

*- For tourism and resort projects: There are 12 licensed projects nationwide; the number of projects is about 23% higher than in 2021; 30 projects have completed construction.*

*+ About the number of projects and apartments eligible to sell houses formed in the future*

*Across the country, there are 252 projects with 65,909 apartments eligible to sell houses formed in the future as announced by the Department of Construction (a decrease of nearly 50,000 apartments and an increase of about 58% compared to 2021).*

*+ About the number of transactions for apartments, individual houses, and land plots*

*There are 785,637 successful real estate transactions nationwide. In which: the number of successful transactions of apartments and individual houses is 154,756; the number of successful land plot transactions is 630,881; in Hanoi alone, there are 7,662 successful transactions; in Ho Chi Minh City, there are 10,780 successful transactions.*

**Table 2.4: Transaction volume of apartments, detached houses, and land plots**

	Tổng lượng giao dịch căn hộ chung cư, nhà ở riêng lẻ và đất nền				
	Quý I	Quý II	Quý III	Quý IV	Cả năm 2022
<b>Căn hộ chung cư, nhà ở riêng lẻ</b>	20.325	69.079	51.003	14.349	154.756
<b>Đất nền</b>	153.537	213.018	115.129	149.197	630.881

*Source: Ministry of Construction*

The total number of successful transactions of apartments and individual houses is about 138.6% higher than in 2021. The summary table shows that the number of successful apartment and single-house transactions in the quarters of 2022 is unstable; the number of successful apartment and single-house transactions increases the most in the second quarter of the following year, then decreases and reaches its lowest in the fourth quarter.

The total number of successful land transactions is about 370% higher than in 2021. The summary table shows that the number of successful land transactions in the quarters of 2022 is not stable; the number of land transactions increases the most in the first quarter, then declines sharply in the second quarter, before slightly increasing in the fourth quarter compared to the previous quarter. third quarter. Transactions in the second half of 2022 decreased sharply compared to the first half of the year, only by 50%. The main reason is the difficulty of real estate capital flow and rising interest rates, which make investors hesitant in their investment decisions. The selling price showed signs of slowing down; some projects had to use flexible sales policies, discounting, interest rate support, a grace period for principal, loan commitments, etc. Regarding bond capital flows, period At the end of the year, the bond comes to its final settlement period, forcing the bond issuer to pay both principal and interest to investors. Meanwhile, enterprises are not allowed to is-

sue bonds for the purpose of debt restructuring and debt reversal, showing great pressure on cash flow. It is estimated that the real estate industry currently accounts for 59% of the total value of mature corporate bonds. In 2022 alone, up to 35.56 trillion dong of debt mobilized through corporate bonds will mature and increase sharply to 61.37 trillion dong in 2023. Meanwhile, as of August 2022, the scale of bond issuance by real estate enterprises decreased by 84% compared to the same period in 2021. accumulated in the first 9 months of this year, the total value of bonds bought back by businesses was VND 142,209 billion, accounting for 11.8% of the outstanding bond market. The early repurchase of bonds has partially reduced the maturity of corporate bonds. However, the reality shows that the ability to reverse the bond debt of the real estate group is quite low. It is time for the authorities and the issuers themselves to join hands to find a satisfactory solution to this problem.

In 2022, legal problems will be solved and completed by state agencies. The government and the National Assembly have had many overall solutions to remove difficulties for the real estate market, such as: establishing a working group under the Prime Minister; Draft amendments to Decree 65/2022/ND-CP amending and supplementing a number of articles in Decree 153/2020/ND-CP on offering and trading individual corporate bonds in the open direction and appropriate roadmap; Dispatch 1164/CD-TTg on removing difficulties for the real estate market and housing development... to restore investor confidence. For financial matters, the government has issued Decree 65/2022/ND-CP amending Decree 153/2020/ND-CP regulating the private offering and trading of corporate bonds in the direction of control. more closely, as a basis for enterprises to continue to issue bonds.

The policy to promote disbursement of public investment, of which the group of infrastructure projects accounts for a large proportion, will create many economic zones, promote tourism, develop urban areas, etc., leading to a demand for houses and vacations. maintenance services, offices, etc. Especially the industrial real estate segment in the trend of shifting industrial facilities of multinational corporations around the world. The market will enter a phase of rebalancing and continue to develop sustainably when the state well regulates policies and tools to regulate supply and demand of real estate, such as taxes, credit, land, and finance, or attracts investment.

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## THE IMPACTS OF AUDIT QUALITY TO THE PERFORMANCE OF LISTED FIRMS IN VIETNAM

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**ABSTRACT:** *This paper reviews empirical research on audit quality, with a particular focus on defining the quality of audit and categorized indicators of audit quality following to some well-known previous framework. It, then, moves to listing some measurements that can be feasible to applied in Vietnamese markets. The last part will create a model and assess the impact of audit quality through its indicators and the link between audit quality and firm performance on 713 listed companies on the stock exchange from 2000 to 2021. The results indicates that the level of audit quality does not have significant impact on the firm performance but it considerably impact to the cost of debt.*

**Keyword:** *Audit quality, audit indicators, firm performance, cost of debt, listed companies, Vietnam's stock exchange*

### 1. INTRODUCTION

Information about an enterprise's financial statement is a crucial basis for various different users to make economic decisions. Especially, in the stock market, financial information provided by the issuer must be trustworthy, accurate, comprehensive and timely manner. This is a key factor in gaining investors' trust, thus, independent audit activities that evaluate and validate the accuracy and reasonableness of financial accounts are particularly significant.

Indeed, auditing is valuable for its ability to provide independent assurance of the accuracy of accounting information, which helps to ensure efficiency in contracting and resource allocation. A failure in auditing can cause a disruption to staff, and day-to-day business, presenting a financial burden to the company. The collapse of Enron and WorldCom in the 2000s was a model of audit failure leading to the losses of 5.000 Enron employees. In the long term, this event lowers the esteem of the auditing profession in the eyes of the world, specifically, it erodes the confidence of investors, making them doubt the authenticity of reports published and increasing their costs of capital. Besides, the ex-post case of audit failure also raises questions of the quality of audit in economic systems. Indeed, after the Enron scandal, there has been a large number of research on the audit quality issued making many aspects of the topic clear, hence, enhancing perception of readers about the discussion. Despite the essential of the auditing, it has always been a challenge to define, measure and assess the quality of audit because it is difficult to identify the criteria of audit quality evaluation and there is no general recognition or universal acceptance for these criterions.

As mentioned above, audit quality captures great attention from researchers, we are far away from a consensus of how to define and measure it. The paper, therefore, will focus on reviewing two basis aspects of audit quality, that is, the definition of audit quality explained by researchers and the ways to quantify it. The last part of this paper, then, examine the impact of audit quality indicators and the relationship between audit quality and firm performance

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## **2. THEORETICAL FRAMEWORK**

### **2.1. Existing definitions of audit quality**

Audit quality is a complicated topic and hard to achieve a converging definition. Despite more than two decades of research, there is currently no definition of audit quality that achieves recognition and consensus. One of the main reasons is that: The perception of audit quality can depend very much on whose eyes one looks through (Knechel *et al.*, 2013). This led to the difficulty in identifying a homogenous concept and resulting in numerous opinions offered by authorities and individuals about the definition of audit quality over the past 20 years.

From the beginning, DeAngelo (1981) describes audit quality as a result conditioned on the presence of specific attributes of auditors. The author divided the quality of audit into two components: (1) the likelihood that auditors can identify the errors and (2) their actions in response to the discovery (appropriate or not). However, Knechel *et al.* (2013) indicate some issues arise from this definition: (1) it has not reconciled with the risk model, which is used to guide the audit and reflect the auditor's perceptions and (2) there would be some deviations in the perception of market participants. The definition of Francis in 2004 mainly from the United States, in order to assess what we currently know about audit quality with respect to publicly listed companies. The evidence indicates that outright audit failure rates are infrequent, far less than 1% annually, and audit fees are quite small, less than 0.1% of aggregate client sales. This suggests there may be an acceptable level of audit quality at a relatively low cost. There is also evidence of voluntary differential audit quality (above the legal minimum share the view with DeAngelo L (1981) that audit quality can be conceptualized as a theoretical continuum spanning from very poor to very high audit.. In the study of 2011, Francis emphasis and confirmed the importance of audit characteristics through breaking down the notion of audit quality in specific components. Specifically, the quality of audit can be defined through the quality of these stages: Audit inputs; Audit process; and Audit outcomes.

According to (Knechel *et al.*, 2013), all stakeholders including investors, debt holders, suppliers, customers, auditors, and regulators may have very different perspectives as to what forms audit quality. The user of financial reports may think that high audit quality indicates the absence of material misstatements. The auditor may define high quality of audit as satisfactorily completing all engagements required by the firm's audit methodology. The audit firm may assess a high-quality audit as one for which the work can be defended against challenge in an inspection or court of law.

Besides, some researchers define audit quality in terms of failure (Peecher & Piercey, 2008). However, in reality, there are relatively few cases of detectable audit failures (J. R. Francis, 2011).

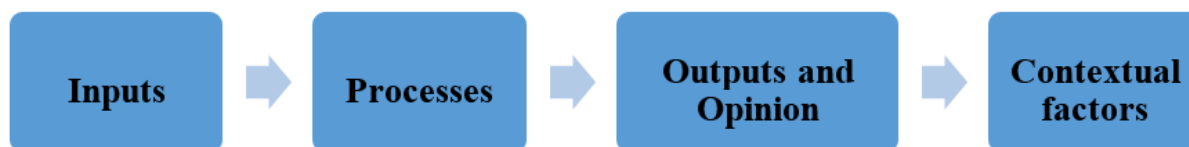
In sum, the definition highlights the significance of various aspects of audit quality. Each of them is deemed necessary for adequate measurement. However, in many situations, a widely accepted definition of audit quality is less important than agreeing on indicators of the construct that would be useful for users.

### **2.2. Common framework for audit quality assessment**

Although audit quality captures great attention from researchers, we are far away from a consensus of how to define and measure it. To gain an insight about audit quality, many researchers have constructed their own theoretical frameworks discussing its components (Deis and Giroux, 1992; Francis, 2011; Knechel *et al.*, 2013; Christensen *et al.*, 2016).

The first formal attempt to develop an audit quality framework was undertaken by the U.K's Financial Reporting Council (FRC) in 2006. And in 2008, after extensive consultation, the FRC identified five drives of audit quality: (1) the culture within an audit firm; (2) the skills and personal qualities of audit partners

and staffs; (3) the effectiveness of the audit process; (4) the reliability and usefulness of audit reporting, and (5) factors (typically abnormal accruals) outside the control of auditors affecting audit quality (Knechel *et al.*, 2013). Depending on that, several papers then have defined audit quality in terms of audit inputs, audit processes, outputs and opinions and audit context (Bedard, Johnstone and Smith, 2010; Francis, 2011; Knechel *et al.*, 2013; DeFond and Zhang, 2014). This framework is also mainly proposed by the PCAOB (2013), IAASB (2013), and KPMG (2011) as their general audit quality framework. Figure 1 depicts the general audit quality framework referencing components consistent with those listed above.



**Figure 1.1: General audit quality framework**

The Figure 1 is now examined in detail:

#### ***Audit inputs***

There are two main inputs to the audit process that are people who do audits, and the audit tests used to gather evidence (J. R. Francis, 2011). Consistent with this definition, Knechel *et al.*, (2013) also defined the inputs to an audit that are reflected in the individual characteristics of the audit team and inherent to the audit process. Specifically, the input information needed for an audit depends on the personnel available for an engagement, the abilities, and expertise of the audit team, the audit technology and the methodology being used. As a result, the inputs of audit cannot be defined in quantitative terms and the judgements of the auditor will directly influence the audit quality. To improve the quality of the evidence on which the auditor bases decisions, the inherent reliability of the evidence used in the audit and the relevance or attribution of the audit evidence to the ultimate claim being audited, i.e., the client's claim requires a rigorous research program that systematically examines (J. R. Francis, 2011). In sum, the quality of audit is significantly influenced by the level of its inputs.

#### ***Audit process***

The audit process includes many phases, representing the implementation of audit inputs (Francis, 2011; Knechel *et al.*, 2013). Therefore, the quality of the audit process is dependent on the quality of auditor judgements throughout each phase. Moreover, in the term of assessing risk, fraud risk assessments are more likely to be underestimated when auditors use holistic methodologies rather than approaches that independently analyze the risks of fraud for distinct components (Wilks & Zimbelman, 2004; Zimbelman, 1997). Furthermore, the judgements of an auditor also influence other phases of the audit process, e.g., when performing analytical procedures, and obtaining and evaluating audit evidence (Knechel *et al.*, 2013).

#### ***Outcomes***

Many literatures have viewed the level of audit quality in terms of having certain negative outcomes on companies and external users (Bailey, 1982; Chang *et al.*, 2009; J. R. Francis, 2004). These outcomes are sometimes direct, including the informativeness of the audit report, the auditor's opinion of the going-concern issue, and the auditor's opinion on the effectiveness of the client firm's internal controls over financial reporting (Zhang, 2018). In practice, the "misreporting" rate of the auditor in issuing a going-concern report have a negative effect to audit quality (J. R. Francis, 2004).

### *Contextual factors*

Besides different factors mentioned from these above perspectives (inputs, progress, outcomes), there are also many contextual features have been found to influence the quality of audit, some of remarkable features are listing below:

#### *Abnormal audit fees*

Researchers have documented that excessive audit fees can create incentives for auditors to acquiesce to client pressure for substandard reporting; thus eroding audit quality and leading to a higher cost of capital (Hope et al., 2009; Reynolds & Picconi, 2010; Stanley, 2011).

#### *Auditor tenure*

The length of the auditor client relationship can potentially impact the audit quality. DeAngelo L (1981) argued that audit tenure can cause a negative impact on both two main components of audit quality, that is: auditor competence and audit independence. The deterioration in audit quality in a short tenure audit can be attributed to either a lack of competence or a loss of independence, but degradation in audit quality in a long tenure audit is most likely attributed to a loss of independence.

#### *Individual auditor industry specialization*

When being out of specialization, the auditors are not effecting at detecting errors, and real teams perform below the nominal team benchmark in the detection of both mechanical and conceptual errors (Nelson et al., 1995). The result is vice versa if the auditors work within their industry specialization.

#### *Audit firm size*

(DeAngelo L, 1981) argued that audit quality is directly related to the size of audit firm. Large firms stand to lose more economic benefits than small ones, because they have more clients. From that reason, they have a greater incentive to supply higher quality audit in order to avoid a loss in reputation, and thus accounting firm size serves as a proxy for audit quality.

### **2.3. Understand of Vietnamese stock market**

The stock market is a key component of the economy. Levine (1991) discovered a positive relation between the economic growth and the stock market through issuing new financial resources to the companies. Spears (1991) argues that financial intermediation stimulated economic growth in the early phases of development. An efficient stock market also help attract more investment through financing productive projects that lead to economic growth; mobilizing domestic savings allocating capital effectively; minimizing risk via diversification and facilitating the exchange of goods and services (Caporale et al., 2004; Mishkin, 2001).

About stock market in Vietnam, it is quite young that has a lower market capitalization and less liquidity comparing with other markets. However, the Vietnamese stock market still plays its essential role in mobilizing medium to long-term capital for economic development. The market consists of two stock exchanges: Ho Chi Minh stock exchange (HSX) and Hanoi Stock Exchange (HNX). In the initial stage (2000 – 2005), the capitalization of Vietnam's stock market was only 1% of GDP. After the global financial crisis in the period of 2008 - 2009, the stock market started booming and attracting a large number of foreign investors, then, the stock market capitalization to GDP increased rapidly from 12.4% in 2008 to 72.6% in 2019. Overall, just in a period of 20 years, the Vietnamese stock market has significantly been increasing in the quantity of the companies listed, market capitalization and trade volume, with an average growth rate of approximately 30% per year.



## **2.4. The impacts of audit quality in Vietnamese stock market**

The topic of audit quality has caught attention from researchers in Vietnam. PHAM et al. (2020) find a significant impact on the stock synchronicity in the case of the Vietnamese market. The quality of the audit is positively related to stock price synchronicity. This finding can be explained through the mechanism: Audit quality improves the transparency of the corporate reporting and disclosure, which in turn makes stock prices more synchronous.

The effect of audit quality to financial statements users in the Vietnamese financial market (Do & Trung, 2015). The development of a market economy, especially the financial markets is asking for transparency and truthfulness of the financial information with high quality. Accordingly, financial information users, such as investors, etc. consider auditing reports the base for decisions. They primarily rely on the guarantee that information in financial reports is precise, complete and unbiased. Hence, to lessen corporate finance risks and increase public trust, the quality of auditing is essential.

## **3. DATA AND RESEARCH METHOD**

### **3.1. Data collection**

For my study, I will focus on the impact of audit quality to the performance of listed enterprise in Vietnam stock exchange. The paper would cover the data of 713 enterprises listed on the HSX and HNX over the period of 21 years (from 2000 to 2021) which was gathered mostly from audited financial statements, transparency reports of audit firms and yearbooks from the Stock Exchange and Finpro computer system. Furthermore, only enterprises which were active during the examined period were considered. In addition, companies in our dataset are required to have reported a full annual account. The final sample consists 713 firms with 14,973 observations.

### **3.2. Variable construct and research method**

#### **3.2.1. Variable construct**

The most crucial to my paper is to estimate audit quality. The quality of audit is unobservable. Following the literature on audit quality, I construct measure to capture audit quality following the auditing firm reputation (BIG4) and the quality of clients' earning.

#### *Audit quality measured by the auditing reputation*

Regarding auditing reputation, I simply code auditing firms who belong to big 4 group 1 and 0 for the others. This measure is widely used in audit quality literature which includes Nguyen, Vu and Yin (2020) 482 U.S. firms between 2000 and 2009, we demonstrate that high audit quality is associated with lower innovation output, measured by patent counts and patent citations. The effect remains valid after a series of tests for endogeneity issues, alternative measures of audit quality, and different subsamples. We also find that firms with high audit quality attract more non-dedicated institutional investors and financial analysts, who often exert excessive pressure on managers for short-term performance. These pressures, in turn, exacerbate managerial myopia and lead them to forgo investments in innovation. Our findings provide new insights into audit quality by showing its undesirable, most likely unintended, consequences.”, ”author”: accruals quality, and the cost of equity in the context of Vietnam. Particularly, we examine the impact of auditor size and accruals quality on the industry-adjusted earnings – price ratio. Using a sample of Vietnamese listed companies, the study shows that firms audited by a Big Four auditor are associated with a lower cost of equity than firms with a non-Big Four auditor. The results indicate that the auditors’

information role is more relevant than the insurance role in a civil law context with a relatively low auditor litigation risk. In addition, the findings show that companies with better accruals quality are associated with a lower cost of equity. The study has implications for managers and regulators. The findings highlight the importance of ensuring sound auditing practices and maintaining high-quality financial reporting for corporations.”;”author”: (Le et al., 2021 study the effect of audit quality on cost of capital.

In addition, the Big 4 audit firms are known for providing higher quality audits than non-Big 4 firms<sup>1</sup>. Indeed, Big 4 auditors are considered to have more independence than smaller audit firms for several reasons. Firstly, their reputation is at greater risk if they are negligent. Secondly, they depend less on the revenue from a single client; therefore, they less likely to be influenced by them. Lastly, their larger revenue base means they face a higher risk of litigation (DeFond & Zhang, 2014; Palmrose, 1988). In Vietnam, the Big 4 firms (Deloitte, Ernst & Young, KPMG, and PricewaterhouseCoopers) audit 40% of publicly traded companies<sup>2</sup> that account for a large share in Vietnamese audit market. Hence, the author expect *Big 4 indicator* would be a suitable proxy to measure the quality of audit in Vietnam environment.

*Audit quality is measured by the number of professional auditors in audit firms*

Prior research indicated that the quality of audit can be extracted from four factors related to human capital of audit firms, including: Educational of auditors; work experience of auditors; professionalism and continuing professional education of auditors (Lee et al., 1999). Two indicators of the level of auditors are used to derive audit quality: *hour* representing the total training hours for auditors and *KTV* representing the number of professional auditors in audit firms.

*Audit quality is measured by the size of audit firms*

Despite the wide range of adopted measures, “size” can be considered as the most effective indicator of audit quality determination (C. S. Lennox, 1999). Consequently, higher quality of audit can be easier achieved by the larger audit firm (J. R. Francis, 2004) mainly from the United States, in order to assess what we currently know about audit quality with respect to publicly listed companies. The evidence indicates that outright audit failure rates are infrequent, far less than 1% annually, and audit fees are quite small, less than 0.1% of aggregate client sales. This suggests there may be an acceptable level of audit quality at a relatively low cost. There is also evidence of voluntary differential audit quality (above the legal minimum, because of their ability to discover and detect the misstatements (DeAngelo L, 1981). The thesis, then, use the size of audit firms that represent through their revenue (*asale*) to measure the quality of audit.

*Audit quality measured by the accounting information quality – Discretionary accruals*

A large abnormal or discretionary component of accruals is indirect evidence of earnings management behavior and lower earning quality (J. R. Francis & Yu, 2009). Since we do not examine any specific managerial incentives, therefore, we use the absolute value of discretionary accruals (|DA|) as the independent variable in the next test. Discretionary accruals (DA) are deflated by total assets and estimated by year and for each industry through the cross-sectional modified version of the Jones model (Dechow et al., 1995; Jones, 1991). The model to estimate discretionary accruals is described below:

$$TACC_{ijt} = \alpha_0 + \alpha_1 \left[ \frac{1}{A_{ijt-1}} \right] + \alpha_2 \left[ \frac{\Delta SALE_{ijt} + \Delta REC_{ijt}}{A_{ijt-1}} \right] + \alpha_3 \left[ \frac{PPEGT_{ijt}}{A_{ijt-1}} \right] + \alpha_4 ROA_{ijt} + \epsilon_{ijt} \quad (1)$$

<sup>1</sup> How Big-4 Firms Improve Audit Quality | Management Science (informs.org)

<sup>2</sup> Big Four audit 40% of public companies in Vietnam - VnExpress International

As many prior study, we measure total accruals (TACC) through the difference between net profit after tax and net cash flow from operation activities, deflated by lagged assets (Becker et al., 1998; Jones, 1991; Kothari et al., 2005). The fomula is described below:

$$TACC_{ijt} = \left[ \frac{\Delta CA_{ijt} - \Delta CL_{ijt} - \Delta CASH_{ijt} + \Delta STD_{ijt} - \Delta DEP_{ijt}}{A_{ijt-1}} \right] \quad (2)$$

where  $\Delta CA_{ijt}$  is the change in current asset;  $\Delta CL_{ijt}$  is the change in current liability;  $\Delta CASH_{ijt}$  represent for the change in cash and cash equivalent in the balance sheet;  $\Delta STD_{ijt}$  is the change in short-term debt;  $\Delta DEP_{ijt}$  is the change in the accumulated depreciation.

The orther variables of the model (1) are defined respectively:  $A_{ijt-1}$  is total asset of prior year;  $\Delta SALE_{ijt}$  is change in sale of the current year;  $\Delta REC_{ijt}$  is the change in accounts receivable of the current year;  $PPEGT_{ijt}$  is property of the current year, plant and equipment (gross total); and  $ROA_{ijt}$  is return on asset of the current year. Then TACC minus the predicted value (non-discretionary accruals) from the below regression (Asthana & Boone, 2012) resulting discretionary accruals (DA), thus:

$$\frac{NDA_{ijt}}{A_{ijt-1}} = \beta_1 \left[ \frac{1}{A_{ijt-1}} \right] + \beta_2 \left[ \frac{\Delta SALE_{ijt} - \Delta REC_{ijt}}{A_{ijt-1}} \right] + \beta_3 \left[ \frac{PPEGT_{ijt}}{A_{ijt-1}} \right] + \beta_4 ROA_{ijt} \quad (3)$$

where  $NDA_{ijt}$  is non-discretionary accruals predicted;  $\beta_1, \beta_2, \beta_3, \beta_4$  can be estimated by using OLS regression with (1) Equation ( $\alpha_1, \alpha_2, \alpha_3, \alpha_4$ ).

The above model is one of many variations of DA model. Even so, these model all inspired from the model of Jones (1991). In different conditions, we can adjust (1) Equation flexibly to comfort with our objectives, such as McNichols (2002) added cash flow from operation (CFO) as an independent variable in (1) Equation<sup>1</sup>. In addition, the level of discretionary accruals also depend on the size of audited companies, hence, the level of audited firm's equity added in their DA equation (J. Francis et al., 2005)"abstract": "We investigate whether investors price accruals quality, our proxy for the information risk associated with earnings. Measuring accruals quality (AQ).

This modification can be considered as an another proxy for estimating the DA. Thus, the model to estimate discretionary accruals is described below:

$$TACC_{ijt} = \beta_1 \left[ \frac{1}{A_{ijt-1}} \right] + \beta_2 \left[ \frac{\Delta REV_{ijt} - \Delta REC_{ijt}}{A_{ijt-1}} \right] + \beta_3 \left[ \frac{PPE_{ijt}}{A_{ijt-1}} \right] + \beta_4 \left[ \frac{CFO_{ijt}}{A_{ijt-1}} \right] + \beta_5 DCFO_{ijt} + \beta_6 \left[ \frac{CFO_{ijt}}{A_{ijt-1}} \times DCFO_{ijt} \right] + \varepsilon_{ijt}$$

where  $TACC_{ijt}$  is also calculated following the Equation (2);  $CFO_{ijt}$  represent the cash flow from operation in year t;  $DCFO_{ijt}$  is a dummy variable that equals 1 if  $CFO_{ijt}$  is negative; and 0 otherwise; and  $\varepsilon_{ijt}$  is the error term. In addition, the  $\varepsilon_{ijt}$  also represent the estimation of DA.

<sup>1</sup> However, the residual captures in the part of current accrual that is not attributed to the time series of cash flows and other fundamentals (Horton et al., 2020). It, therefore, proxies for managerial discretion in accruals.

**3.2.2. Research method**

This section provides the estimation techniques used in quantifying the effect of audit quality on multiple aspects of the firm. We used a package of STATA software version 16 to estimate the regression equations that we proposed above. Firstly, bivariate relations among variables were explored via Person correlation maix. Next, I analysis the effect of audit quality to firm performance, stock market performance and cost of debt.

The general model is specified as follows:

$$Firm_{i,t} = \beta_0 + \beta_1 Auditquality_{i,t-1} + \sum_{j=2}^n \beta_j X_{j,i,t-1} + f_i + y_t + \epsilon_{i,t} \quad (5)$$

In model (7), *Firm* is the dependent variable captures three aspects of the firm which include: financial performance (ROE, ROA), stock market performance - stock liquidity (alliq) and cost of debt (cdebt). Auditquality is the main variable of interest which captures the quality of auditing services. This variable represents big 4 audit indicator (big4), number of training hours provided by auditing firm (hour), number of auditors (ktv), auditing firm sale (asale) and DA. *Xj* is a set of controlling variables which include firm growth rate (growth), leverage ratio (lev) and firm size (size).  $\epsilon_{i,t}$  is the error term.  $f_i$  and  $y_t$  are firm and year indicator variables, respectively. The dependent variable is lead 1 year to avoid simultaneity issue.

**4. RESULTS AND DISCUSSION**

**4.1. Results**

**4.1.1. Descriptive Statistics**

Table 2 provides descriptive statistics for the variables used in this study. On average, auditing firms report 49.8 auditors, with the median of 48. It shows the data is pretty symmetrical. The other audit quality measures show the similar pattern. For example, the number of training hours shows the mean of 7.466 and the median is of 7.637.

Regarding the other firm financial variables, it is pretty consistent with the other studies focus on the Vietnamese market. For example, the average return on asset (ROA) of my sample is 0.04 (4%), the average return on equity (ROE) is 0.063 (6.3%).

**Table 2: Descriptive statistics This table provides descriptive statistics for the variables used in this study.**

The detailed definitions are reported in Table 1

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	N	mean	sd	p25	p50	p75
da	12,446.00	0.019	0.021	0.005	0.012	0.025
hour	1,588.00	7.466	0.975	6.928	7.637	8.176
ktv	3,528.00	49.838	31.427	24.000	48.000	68.000
asale	3,188.00	11.932	1.122	11.004	11.921	12.438
big4	15,255.00	0.204	0.403	0.000	0.000	0.000
Alliqy	6,503.00	0.000	0.000	0.000	0.000	0.000
roa	12,527.00	0.040	0.253	0.009	0.038	0.082
roe	12,220.00	0.063	2.111	0.032	0.099	0.176
cdebt	10,271.00	2.839	460.939	-0.099	-0.067	-0.039
growth	11,327.00	0.565	20.197	-0.116	0.055	0.230
lev	12,621.00	0.578	1.059	0.319	0.530	0.711
size	12,621.00	26.839	1.944	25.828	26.774	27.884

Source: Compiled by the author

**Table 2** provides the Person correlation matrix of the variables used in the study. The first 5 variables measure audit quality. They show the strong and positive correlation, DA is an exception. Within 4 other variables, ktv (measures number of auditors) shows the significant but negative relation with DA, big4 (captures whether the firm is audited by big4 auditing firms or not) shows the insignificant relation. This causes a doubt on the reliability of DA in measuring audit quality. The primary correlation result is consistent with previous studies on the accuracy of audit quality measurement.

**Table 3**

**This table provides the Person correlation matrix for the variables used in the study.**

**Detailed variable definitions are provided in the Table 1.**

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) DA	1.000											
(2) hour	0.078**	1.000										
(3) KTV	-0.085***	0.694***	1.000									
(4) asale	0.071***	0.569***	0.661***	1.000								
(5) big4	0.003	0.350***	0.222***	0.817***	1.000							
(6) Alliqy	0.007	-0.004	-0.106***	-0.093***	-0.034*	1.000						
(7) roa	-0.023**	0.006	0.018	0.042*	0.024***	0.001	1.000					
(8) roe	-0.011	0.011	0.013	0.024	0.005	-0.019	0.048***	1.000				
(9) growth	0.013	0.023	-0.007	-0.035*	-0.002	-0.017	-0.005	-0.002	1.000			
(10) lev	0.107***	0.000	-0.018	-0.037*	-0.014	-0.000	-0.386***	-0.007	-0.001	1.000		
(11) size	-0.326***	0.338***	0.179***	0.425***	0.381***	-0.031	0.021**	0.008	0.004	-0.018**	1.000	
(12) cdebt	-0.006	0.064*	0.034	0.028	0.017*	0.006	-0.003	-0.000	-0.000	0.003	0.014	1.000

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The **Table 3** shows us the correlation between variables used in the research model. We can see that most of the variables are relatively closely correlated with each other. The results tables also shows that the Big 4 audit firms and the audit firm's sales have a positive relationship. Besides, the training hour of auditors also face a positive relationship with the number of auditors and audit firm's sales. These results are explained by the fact that the Big 4 audit firm in Vietnam commonly get a higher revenue than non-Big 4 audit firms and the larger of the audit firm size, the higher of its sales.

#### 4.1.2. Regression analysis

##### 4.1.2.1. Effect of audit quality on firm financial performance

This section analyses the effect of audit quality to firm performance, stock market performance and cost of debt. To measure financial performance, we rely on the profitability measures include return on equity (ROE) and return on asset (ROA).

**Table 4: The effect of audit quality on firm financial performance**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	lroa	lroe	lroa	lroe	lroa	lroe	lroa	lroe	lroa	lroe
da	0.525***	1.597***								
	(6.24)	(8.53)								
asale					0.007*	0.007				
					(2.03)	(0.72)				
big4							0.002	0.015**		
							(0.55)	(2.12)		
ktv									-0.000	-0.000
									(-0.04)	(-1.52)

growth	0.000**	0.000**	0.005	0.007	0.001	0.005	0.000***	0.000***	0.001	0.002
	(2.17)	(2.78)	(1.73)	(2.01)	(1.29)	(1.38)	(3.02)	(4.15)	(1.45)	(1.10)
lev	-0.006*	-0.013***	0.102**	0.219	-0.007	0.009	-0.005	-0.009**	-0.007	0.008
	(-2.07)	(-3.01)	(2.69)	(1.23)	(-1.38)	(0.79)	(-1.70)	(-2.27)	(-1.39)	(0.77)
size	-0.007**	-0.030***	-0.038**	-0.033	-0.019*	-0.060	-0.008**	-0.034***	-0.022**	-0.055
	(-2.35)	(-3.90)	(-2.80)	(-0.55)	(-2.37)	(-1.97)	(-2.38)	(-4.14)	(-2.59)	(-1.86)
_cons	0.231**	0.875***	1.063**	0.993	0.649**	1.799*	0.255***	1.001***	0.654**	1.585
	(2.77)	(4.20)	(3.09)	(0.66)	(2.79)	(2.08)	(2.88)	(4.57)	(2.76)	(2.00)
ar2	0.5573	0.2445	0.6525	0.2918	0.5994	0.1651	0.5481	0.2295	0.5941	0.1889
N	9311	9066	796	773	1725	1679	9318	9072	1718	1672

Sources: Self compiled by the author

**Table 4** reports the regression result of firm performance measured by ROA and ROE on audit quality. Audit quality measures present an inconsistent impact on firm performance as there is one variable shows an insignificant and negative impact and there are other three other shows a positive and significant. The variable *da* captures the accrual quality shows the strongest impact of audit quality on both of the variables measure firm performance

**4.1.2.2. The effect of audit quality on firm stock market performance**

This section studies the effect of audit quality on the performance of stock in the market. Firm stock behavior is measured by market liquidity. The assumption is that if audit quality enhances information quality, stock will be more liquid as investors are more active in there trading.

**Table 5: Effect of audit quality on stock market performance**

	(1)	(2)	(3)	(4)	(5)
	IAlliq	IAlliq	IAlliq	IAlliq	IAlliq
DA	-0.000				
	(-0.29)				
hour		-0.000			
		(-0.89)			
asale			-0.000		
			(-1.83)		
big4				-0.000	
				(-1.62)	
KTV					-0.000
					(-0.23)
growth	-0.000	0.000	0.000*	-0.000	0.000
	(-1.56)	(0.97)	(2.34)	(-1.62)	(1.66)
lev	0.000***	-0.000	-0.000	0.000***	0.000
	(3.01)	(-0.95)	(-0.00)	(2.89)	(0.32)
size	0.000	0.000*	-0.000	0.000	-0.000
	(0.12)	(2.09)	(-0.10)	(0.26)	(-0.12)
_cons	0.000	-0.000	0.000	0.000	0.000
	(0.31)	(-1.59)	(0.91)	(0.19)	(0.30)
ar2	0.4821	0.5396	0.6044	0.4826	0.5489
N	2314	339	704	2314	781

Sources: Self compiled by the author

Although the effect of audit quality on stock liquidity is suggestive, I do not find evidence supports this assumption. All my five measures of audit quality show insignificant impact on the level of market liquidity. This seems contradicting with the findings in the developed markets where audit quality is proven to have positive impact on market performance.

#### 4.1.2.3. Effect of audit quality on cost of debt

This section investigates the effect of audit quality on the cost of debt which is measured by dividing interest expense to total debt bearing cost (short and long-term borrowing). The result is reported in the table below:

**Table 6: The effect of audit quality on the cost of debt**  
**This table reports the regression result of cost of debt on**

	(1)	(2)	(3)	(4)	(5)
	cdebt	cdebt	cdebt	cdebt	cdebt
DA	-0.215**				
	(-2.10)				
hour		-0.004			
		(-0.50)			
asale			-0.006***		
			(-16.92)		
big4				-0.003	
				(-0.49)	
KTV					0.000
					(0.88)
growth	0.000	0.003	0.002**	0.000	0.002***
	(0.60)	(1.90)	(3.05)	(0.42)	(4.73)
lev	0.004*	0.118	0.014***	0.004*	0.013***
	(1.85)	(1.50)	(5.14)	(1.85)	(4.72)
size	0.024***	0.024	0.050**	0.024***	0.037**
	(5.45)	(1.34)	(3.90)	(5.79)	(3.28)
_cons	-0.735***	-0.760	-1.383**	-0.748***	-1.110**
	(-6.10)	(-1.59)	(-3.99)	(-6.54)	(-3.59)
ar2	0.1878	0.259	0.2391	0.1868	0.223
N	8687	729	1513	8694	1660

Sources: Self compiled by the author

In this table, all five audit quality measures show consistent and negative effect on cost of debt. However, there are two of them that are accrual quality (DA) and the sale of auditing firm have significant effect. The other variables have negative but insignificant effect.

## 4.2. Findings and discussion

For the results that I test the quality of five audit quality indicators which was conducted on the theory framework. The statistic results show that the quality of audit is insignificant impact to the market liquidity and have a negative impact on cost of debt. The findings is not cope with the theory of audit quality in developed country about the positive impact on market performance. This can be explained by the fact that Vietnam is still an frontier markets whereas those studies conducted in developed market that can lead to the mismatch with the characteristics of the practical situation in Vietnam.

## 5. CONCLUSION

The paper investigated the impact of audit quality on performance on the sample of 713 Vietnamese listed enterprises in the period of 2000 – 2021. According to the statistics, audit quality has a little influence on market liquidity and a negative impact on cost of debt. The findings contradict the hypothesis of audit quality in developed countries about the favorable influence on market. This is due to the fact that Vietnam is still a frontier market, whether research countries may result in a mismatch with the features of the actual situation in Vietnam.

Some limitations of this paper should be commented, as follows: this research carried out using a convenience sampling method, leading that the results were mainly subjective by the research author, which reduced the objectivity and generalization. Therefore, the further researchers should consider the use of probability sampling method to ensure higher representations and increase the size of the research sample for more accurate and more general analysis result. Secondly, the research scope has only been conducted just in several index of profitability of audit quality, so the results of the empirical research only provided some short-term conclusions and recommendations. The further researchers can expand the scope of the thesis both space and time for a more complete and comprehensive assessments.

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## FACTORS AFFECTING THE EFFECTIVENESS AND GROWTH OF LISTED COMMERCIAL BANKS IN VIETNAM

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*ABSTRACT: The growth and efficiency of listed commercial banks have a significant impact on the safety and stability of the financial market. Therefore, there have been numerous studies on this topic. The authors' research topic involves using a research sample of 16 listed commercial banks in Vietnam during the period of 2005-2021 based on table data to evaluate factors related to Return On Assets (ROA) and Return On Equity (ROE), the author group proposes solutions to enhance the effectiveness and growth of listed commercial banks in Vietnam.*

*Keywords: Efficiency and growth, Influencing factors, Commercial banks.*

### 1. INTRODUCTION

Commercial banks are financial intermediaries that play a role as a bridge between investment sectors and savings sectors, assisting the central bank to implement monetary policy, support money supply regulation in the economy, and curb inflation to achieve national growth objectives. However, there are quite a few commercial banks that operate with low efficiency and slow growth. To find solutions to enhance the efficiency and growth of listed commercial banks in Vietnam in the current context, the study focuses on examining the impact of financial characteristic factors of listed commercial banks on ROA and ROE, using a sample size of 16 listed commercial banks in Vietnam during the period from 2005 to 2021. Building on the research of authors such as Athanasoglou and partner (2008); Alexiou and Sofoklis (2009), Nghiem Thi Tha and partner (2021), Pasiouras and Kosmidou (2007); Kosmidou and Pasiouras (2008); Sufian and Habibullah (2012); Chronopoulos and partner (2015); Caporale and partner (2017); Chen and partner (2018)... The research team proposes using three indicators: ROA, ROE, and CGROWTH to reflect the efficiency and growth of listed commercial banks in Vietnam and focuses on examining the impact of financial characteristic factors on these indicators. The research model is as follows:

### 2. THEORETICAL FRAMEWORK AND HYPOTHESIS

#### 2.1. Research model on efficiency

The model used to study the factors influencing the business efficiency of commercial banks is as follows:

$$ROA_i = \beta_1 + \beta_2 CAEQ_i + \beta_3 NPL_i + \beta_4 BASZ_i + \beta_5 PROD_i + \beta_6 INF_i \quad (1)$$

$$ROE_i = \beta_1 + \beta_2 CAEQ_i + \beta_3 NPL_i + \beta_4 BASZ_i + \beta_5 PROD_i + \beta_6 INF_i \quad (2)$$

$ROA_i, ROE_i$ : Dependent variables reflecting the efficiency of listed financial institutions;  $\beta_0$ : Regression coefficient,  $\beta_1, \beta_2, \dots, \beta_6$ : Coefficients representing the impact of independent variables on the dependent variable in the regression model,  $i$ : Investigated listed financial institutions; Research hypothesis: if the positive direction of the independent variables' impact on the dependent variable, the sign (+) is used, and if

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the direction of the independent variables' impact on the dependent variable is negative, the sign (-) is used. The research hypotheses in table 1 of the two research models are summarized as follows:

**Table 1: Research theory, name of variables in the model**

Variables	Meaning	Formula	Expectation sign
ROE (Dependent Variable)	Return On Equity	Net Profit After Tax/Average Total Equity	
ROA (Dependent Variable)	Return On Assets	Net Profit After Tax/Average Total Assets	
CAEQ	The ratio of mobilized capital to equity	Mobilized Capital/ Equity	+
NPL	Non-performing Loan	Loans hasn't paid more than 90 days/Total Loans	-
BASZ	Asset Size	Total Assets	+/-
PROD	Productivity	Net Profit After Tax/Labors	+
INF	Inflation	Inflation Rate	+

(Source: The research team's recommend)

## 2.2. Research model on growth

The regression model is used to examine the impact of factors on the financial performance of Vietnamese commercial banks as follows:

$$CGROWTH_i = \beta_0 + \beta_1 NPL_i + \beta_2 LIQUIDITY_i + \beta_3 DEPOSIT_i + \beta_4 ROE_i + \beta_5 NIM_i + \beta_6 GDP_i + \beta_7 INF_i + \beta_8 RATE_i$$

In this equation,  $CGROWTH_i$  represents the dependent variable reflecting the growth of listed commercial banks;  $\beta_0$  is the regression coefficient,  $\beta_1, \beta_2, \dots, \beta_8$  are the coefficients of the independent variables on the dependent variable in the regression model, and  $i$  is the indexed listed commercial bank under study. The research hypothesis states that if the direction of the positive impact of the independent variables on the dependent variable is observed, it will be denoted by a positive sign (+), and the direction of the negative impact of the independent variables on the dependent variable will be denoted by a negative sign (-). The synthesis of the research hypotheses in Table 2 of the research model is as follows:

**Table 2: Research theory, name of variables in the model**

Variables	Meaning	Formula	Expectation sign
CGROWTH (Dependent Variable)	Annual Credit Growth	$[(\text{Loans To Customers} + \text{Investment Securities})_t / (\text{Loans To Customers} + \text{Investment Securities})_{(t-1)}] - 1$	
NPL	Nonperforming Loan	Loans hasn't paid more than 90 days/Total Loans	-
LIQUIDITY	Liquidity of Bank	Outstanding Balance/ Total Assets	+
DEPOSIT	Annual Deposit Growth	$(\text{Deposits from customers}_t / \text{Deposits from customers}_{t-1}) - 1$	+
ROE	Return On Equity	Net Profit After Tax/Average Total Equity	+
NIM	Net Interest Margin	Net Interest Income/ Average Earning Assets	-
GDP	GDP Growth	GDP Growth Rate	+
INF	Inflation	Inflation Rate	-
RATE	Average Loan Interest Rate	Average Loan Interest Rate	-

(Source: The research team's recommend)

## 3. RESULT

Descriptive statistics of the variables in the model: The data used in the study were synthesized and calculated from the financial reports of 16 listed commercial banks during the period 2005-2021. The listed commercial banks were studied on a scale of two groups: large (1) and small (2), as shown in the following table:

**Table 3: Lists of commercial banks in Vietnam classified by assets size in 2021**

*Unit: Millions*

Order	Ticker Symbol	Assets	Group
1	BID	1.761.695.792	1
2	CTG	1.531.587.398	1
3	VCB	1.414.672.587	1
4	MBB	607.140.419	1
5	TCB	568.728.950	1
6	VPB	547.409.439	1
7	ACB	527.769.944	1
8	STB	521.117.123	1
9	HDB	374.611.571	2
10	VIB	309.517.129	2
11	TPB	292.827.078	2
12	LPB	289.193.879	2
13	SSB	211.663.515	2
14	MSB	203.665.423	2
15	OCB	184.491.035	2
16	EIB	165.831.996	2

The software EVIEW 10 was employed with 272 observations to analyze the characteristics of the aggregated variables presented in the table.

**Table 4: OLS's model regression results of ROA**

Dependent Variable: ROA  
Method: Least Squares  
Date: 02/25/23 Time: 23:32  
Sample: 2005 2021  
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.508759	0.987616	0.515139	0.6166
CAEQ	0.031722	0.057136	0.555191	0.5899
NPL	-0.107820	0.226458	-0.476114	0.6433
BASZ	-2.85E-09	8.89E-10	-3.203069	0.0084
PROD	4.53E-05	1.21E-05	3.746421	0.0032
INF	0.017460	0.016276	1.072724	0.3064
R-squared	0.758711	Mean dependent var	1.222941	
Adjusted R-squared	0.649034	S.D. dependent var	0.457681	
S.E. of regression	0.271141	Akaike info criterion	0.498211	
Sum squared resid	0.808693	Schwarz criterion	0.792286	
Log likelihood	1.765209	Hannan-Quinn criter.	0.527442	
F-statistic	6.917691	Durbin-Watson stat	0.959543	
Prob(F-statistic)	0.003759			

From Table 4, we can see that at a significance level of 5%, there are 2 variables that have a statistically significant effect on ROA, including BASZ and PROD. Among them, the total assets variable (BASZ) has an inverse effect on return on assets (ROA). That is, when total assets increase by 1 million VND, the return on assets decreases by 0.0000000285%, and vice versa. The labor productivity variable (PROD) has a positive effect on ROA. That is, when labor productivity increases by 1 million VND/employee, the return on assets increases by 0.0000453%, and vice versa. The remaining variables, including CAEQ, NPL, and INF, were excluded from the model. The specific effects are explained through the following regression model:

$$ROA_i = 0.058759 - 0.0000000285BASZ_i + 0.0000453PROD_i$$

**Table 5: OLS's model regression results of ROE**

Dependent Variable: ROE  
Method: Least Squares  
Date: 02/25/23 Time: 23:34  
Sample: 2005 2021  
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-12.45030	8.091269	-1.538733	0.1521
CAEQ	1.997497	0.468103	4.267216	0.0013
NPL	-0.664120	1.855311	-0.357956	0.7272
BASZ	-3.38E-08	7.28E-09	-4.646220	0.0007
PROD	0.000525	9.91E-05	5.300998	0.0003
INF	0.121250	0.133347	0.909281	0.3827
R-squared	0.814011	Mean dependent var		14.29765
Adjusted R-squared	0.729471	S.D. dependent var		4.270879
S.E. of regression	2.221387	Akaike info criterion		4.704705
Sum squared resid	54.28015	Schwarz criterion		4.998780
Log likelihood	-33.98999	Hannan-Quinn criter.		4.733936
F-statistic	9.628676	Durbin-Watson stat		0.893357
Prob(F-statistic)	0.000978			

From table 5, we can see: with at a significance level of 5%, there are 3 variables that have statistically significant effects on ROE, namely CAEQ, BASZ, PROD. In that, CAEQ and PROD have a positive impact on ROE. This means that that a 1% increase in the CAEQ, productivity increase by 1 million VND per labor leads to a 1.997497% and 0.000525% respectively and vice versa. The total assets variable (BASZ) has a negative effect on ROE. When total assets increase by 1 million VND, ROE decreases by 0.0000000338%, and vice versa. The variables NPL and INF are excluded from the model. The specific impact is explained in the following regression model:

$$ROE_i = -12.45030 + 1.997497CAEQ_i - 0.0000000338BASZ_i + 0.000525PROD_i$$

**Table 6: OLS's model regression results of CGROWTH**

Dependent Variable: CGROWTH

Method: Least Squares

Date: 02/25/23 Time: 00:26

Sample: 2005 2021

Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	70.96867	40.71112	1.743226	0.1195
NPL	-8.466648	4.064149	-2.083252	0.0708
LIQUIDITY	0.001983	0.008432	0.235142	0.8200
DEPOSIT	0.080874	0.047534	1.701399	0.1273
ROE	0.360073	0.455385	0.790700	0.4519
NIM	-16.10661	9.924742	-1.622875	0.1433
GDP	2.210595	1.626130	1.359421	0.2111
INF	1.940176	0.513404	3.779043	0.0054
RATE	-2.994419	1.390564	-2.153384	0.0634
R-squared	0.908247	Mean dependent var		19.76176
Adjusted R-squared	0.816494	S.D. dependent var		11.99138
S.E. of regression	5.136820	Akaike info criterion		6.415797
Sum squared resid	211.0954	Schwarz criterion		6.856910
Log likelihood	-45.53428	Hannan-Quinn criter.		6.459645
F-statistic	9.898826	Durbin-Watson stat		3.086285
Prob(F-statistic)	0.001975			

From Table 6, we can see that at a significance level of 5%, there are two variables that have statistically significant effects on CGROWTH, namely NPL and INF. Specifically, the non-performing loan ratio (NPL) has a negative impact on the annual credit growth rate (CGROWTH). This means that a 1% increase in the NPL ratio leads to an 8.466648% decrease in the annual credit growth rate, and vice versa. The inflation rate (INF) has a positive impact on CGROWTH. This means that a 1% increase in the inflation rate leads to a 1.940176% increase in the annual credit growth rate, and vice versa. The variables LIQUIDITY, DEPOSIT, ROE, NIM, GDP, and RATE are excluded from the model. The specific impact is explained in the following regression model:

$$CGROWTH_i = 70.96876 - 8.466648NPL_i + 1.940176INF_i$$

### 3. DISCUSSION

#### 3.1. Reasons for the limitation of the growth and efficiency of listed commercial banks in Vietnam

Regarding general limitations, the impact of the epidemic on the economy has led to a decrease in demand for credit. According to Ella Zoe Doan (2020), Covid-19 will cause household spending to decrease by an average of 15% in areas such as education, housing, food, entertainment, etc. When consumer spending decreases, the demand for consumer loans will decrease accordingly. Nevertheless, with the advent of vaccines, credit growth in 2021 has accelerated. Although banks have restricted personal lending during this period to avoid bad debts, such credit growth has proven that credit demand has strongly recovered distinctively in 2021.

Moreover, according to the report, most banks recorded an increase in Net Interest Margin (NIM) during the first half of 2021. Many banks recorded a decrease in NIM in the third quarter compared to the second quarter by 10-30 basis points and this will continue to rise in the next few quarters. In the situation when Vietnamese commercial banks are towards applying Basel III standards, the reduction of NIM will put pressure on banks to improve capital “buffer” criteria such as capital adequacy ratio (CAR), required reserve ratio, etc.

Regarding specific limitations to bank size, there are a number of limited aspects in accordance with two types of bank size stated as follows:

For large commercial banks group, the number of banks such as BIDV and Vietinbank is still facing difficulties in raising capital as the charter capital of these two banks has not increased significantly in recent years. The consequence of this problem is the inability to meet the regulations on the CAR coefficient and many other regulations of the State Bank. By the end of 2021, although many banks have been recognized to apply Basel II successfully, among the big banks, Vietinbank and Sacombank have not yet been able to apply it. However, banks having been recognized in successfully applying Basel II mostly stopped at “measuring and ensuring the minimum level of CAR” while the second pillar is considered the most difficult to implement as the development of an “internal assessment process of capital adequacy” has not been stimulated.

Moreover, the past few years have marked a significant step forward in handling the bad debts of large-scale banks. Although the bad debt ratio of most banks is below 2%, they still have difficulty recovering bad debts. For example, VPB when the bad debt ratio in recent years has always been at approximately or above the safe threshold of 3%.

Furthermore, large commercial banks with a lower return on assets (ROA) compared to the average ROA each year tend to decrease. But they still account for a high proportion of listed commercial banks in Vietnam. In 2021, in this group of banks, the number of commercial banks with a ROA smaller than the average ROA includes: VCB, BIDV, Vietinbank, and Sacombank.

For small commercial banks, due to the low owner’s equity, the financial capacity of these banks is not high and the banking performance is still poor. These banks have not yet expanded their business network and the ability to expand credit and services is still low and limited, especially the low ability to mobilize capital, therefore they have not improved much in terms of qualifications and technology equipment.

In general, the borrowing rate of the banks is above 60%, indicating that the bank’s lending capacity is ambitious. However, this ratio is too large which can lead to a decrease in the solvency of commercial banks. Although the bad debt ratio is always within a safe level, it shows that these banks have not found effective measures to recover bad debts. Despite the smaller size, the ROE of this group of banks is not lower than that of the large group, showing that the profits of these banks are inconsistent and incompatible. This can cause misunderstandings among investors about how accurate this index is at banks.

Although smaller in scale, the ROE index of this group of banks is not lower than that of the larger group, indicating that the profitability of these banks is not consistent. This may cause misunderstandings for investors about the accuracy of this index in banks.

### **3.2. Proposed financial solutions to improve the efficiency and growth of listed commercial banks in Vietnam.**

In order to enhance the efficiency and growth of listed commercial banks in Vietnam in the near future, the research group proposes two main solutions:

(1) Increase the impact of factors such as asset scale, loan-to-deposit ratio, and revenue growth rate.

(2) Tighten control to limit the negative impact of factors such as loan-to-deposit ratio, cost-to-income ratio, and non-performing loan ratio.

In the short term, listed commercial banks in Vietnam should focus more on the following solutions:

Firstly, promoting digital transformation and enhancing the development of products and services to improve service quality and meet customer needs.

Commercial banks need to modernize their technology and payment systems, focus on marketing activities, and diversify and improve the utility of products. Along with the modernization of technology, commercial banks need to have policies to exploit effective technology through the development of products and product groups based on high technology to improve competitiveness in products and services, create diversity in product selection and increase cross-selling of products to customers. Moreover, commercial banks need to improve and simplify administrative and loan procedures to create customer convenience; identify target customer groups to build an effective customer strategy. It is vital to appreciate traditional customers, loyal customers, and reputable customers in banking transactions. For these customers, when formulating a banking strategy, banks must pay great attention to and associate the bank's activities with the customer's activities to be able to create a sustainable relationship between customers and transaction activities.

The second point emphasizes the importance of active management of non-performing loans (NPLs) as a prerequisite for efficient credit growth.

Financial institutions need to strengthen their internal monitoring to prevent the accumulation of NPLs in the future, maintain appropriate credit rating standards to ensure the quality of loans and create a positive ripple effect from the credit operations of each financial institution. In addition to implementing solutions to address NPLs that financial institutions have already or are currently dealing with (such as asset management companies, provisioning, loan classification and evaluation for loan restructuring, and developing a system for classifying loans according to qualitative and quantitative criteria), financial institutions also need to refine their credit policies to align with international standards.

The third is strengthening electronic transactions to support the business community to create a driving force for socio-economic development.

The Covid-19 pandemic in the past few years has had significant impacts on economic, cultural, and social life, especially for businesses whose reserve resources are gradually running out. However, the signs of recovery are not yet promising. The community of small and medium-sized enterprises continues to face significant pressure. Due to their resilience, it is difficult to face and withstand the current slow recovery situation, notably those in the tourism, service, and transportation sectors. Therefore, it is necessary to strengthen financial and electronic transaction solutions to help businesses operate more easily in the production, business, and exchange of goods in the market.

Commercial banks need to develop a special policy to take care of enterprises that are their customers. The fiscal and monetary policy to support the Economic and Social Development Recovery Program has mentioned the issue of reducing interest rates to 2%. However, for enterprises, reducing interest rates is not as valuable as extending the loan term up to one year and the unsecured lending conditions. Therefore, commercial banks may consider this solution.



The fourth point is that commercial banks need to effectively utilize capital in line with their capabilities and the nature of the banking business with a focus on improving financial capacity and resource allocation efficiency.

Banks should concentrate their capital on sectors encouraged by the government. Diversifying investment portfolios, such as investing in government bonds and Treasury bills of State Bank, can ensure operational stability during market fluctuations. In addition, a rational organization of business networks and relationships with partners will help banks enhance their capacity and maintain the sustainability of mobilized capital.

The fifth is to have reasonable interest rate policies according to guidance.

Interest rates must ensure attractiveness to retain traditional customers as well as attract new ones. Currently, interest rates are still considered a powerful and effective tool for attracting capital. However, this should only be a temporary measure due to the high risk it poses to banks and the potential negative effect on future efficiency. Corporate lending interest rates must be based on a comprehensive calculation and appropriate level of various risks such as credit risk, interest rate risk, term risk, exchange rate risk, and ethical risk. Gradually narrowing the gap between deposit and lending interest rates based on the restructuring of the system of credit institutions is also crucial.

Sixty is actively promoting socio-economic development and taking responsibility for contributing to environmental protection.

Commercial banks need to develop business strategies in line with the State Bank's policies on environmental protection. Accordingly, investment projects from the bank's credit capital must be controlled by environmental regulations and energy-saving policies. Furthermore, commercial banks should actively manage environmental and social risks throughout the operation procedures to mitigate negative impacts on the environment and society. Simultaneously, it is vital to seek and develop business and investment opportunities that are eco-friendly to society.

Seventy is that commercial banks need to actively improve their governance system to comply with the risk management requirements under Base II to strictly adhere to regulations on safety limits in their operations.

To reduce costs and administrative procedures associated with direct supervision, remote monitoring should be enhanced and strengthened. The inspection methods should be renewed frequently from risk identification, assessment, and measurement to the construction and implementation of inspection and supervision activities based on advanced technology and management level. In addition, a culture of compliance throughout the entire system must be fostered.

#### **4. CONCLUSION**

The rapid pace of globalization and trade liberalization in recent years has created many changes in the business environment in Vietnam. International economic integration creates conditions for countries to develop, but this also makes competition in economic fields more intense, and banking and finance are no exception. Foreign banks have been penetrating the domestic market. With long-term experience, modern technology, and large capital backed by strong and reputable financial groups in the world, they are confident that they will fully meet all needs in the financial field. for the Vietnamese. It can be said that foreign financial groups are a challenge for Vietnam's banking industry. The Government and the State Bank

of Vietnam (SBV) have advocated restructuring the commercial banking system according to Decision 254/QĐ-TTg dated March 1, 2012 of the Prime Minister and Decision No. 734/QĐ-NHNN dated 18/03 April 2012 by the Governor of the State Bank to make the banking system healthy, create financial strength and increasing competitiveness for banks. This result affirms that the policies of the Government and the State Bank are completely correct and timely... and also based on the analysis results showing that there are still some limitations in using resources and groundstudy makes recommendations to improve the capacity, business efficiency, and competitiveness of the current post-merger commercial banks in Vietnam to suit the requirements of innovation and the requirements of the trend of international economic integration.

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## PROFITABILITY STATUS OF LISTED CEMENT COMPANIES IN VIET NAM

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**Mentor: Pham Thi Quyen**

**ABSTRACT:** *In recent years, cement businesses have made great contributions to the previous Edit Header battery. However, the growth in the number of cement enterprises and the recession of the economy has led to an oversupply of cement, the business efficiency of many enterprises is still low. Therefore, being fully aware of the general context of the economy, the situation of the industry and each enterprise, thereby finding solutions to overcome difficulties is always a concern of the managers of manufacturing enterprises. cement. In this article, the authors study the profitability status of listed cement companies in the period 2017-2021, analyze the influencing factors, specify the results and limitations. From there, propose some recommendations to improve profitability for listed cement companies in Vietnam*

**Keywords:** *business, cement, profitability*

### 1. INTRODUCTION ABOUT LISTED CEMENT COMPANIES IN VIETNAM TO ANALYZE THE CURRENT

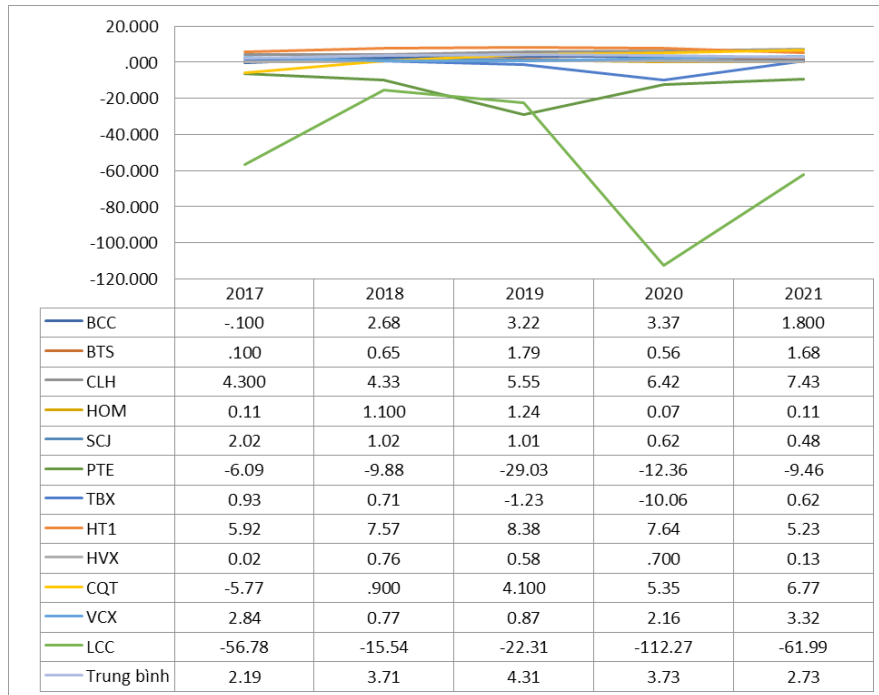
Situation of business efficiency of listed cement companies, the article used data of 12 cement manufacturing, processing and processing enterprises. To analyze and evaluate the current state of business performance of enterprises. Including the following enterprises: Bim Son Cement Joint Stock Company (BCC), Vicem But Son Cement Joint Stock Company (BTS), La Hien VVMI Cement Joint Stock Company (CLH), Vicem Hoang Mai Cement Joint Stock Company (HOM), Sai Son Cement Joint Stock Company (SC)), Phu Tho Cement Joint Stock Company (PTE), Thai Binh Cement Joint Stock Company (TBX), Ha Tien 1 Cement Joint Stock Company (HT1), Vicem Hai Van Cement Joint Stock Company (HVX), Quan Trieu VVMI Cement JSC ( CQT), Yen Binh Cement Joint Stock Company (LCC) and Lang Son Cement Joint Stock Company (Hong Phong) (VCX). The selected enterprises have large scale in terms of business capital. revenue, income and profit, cash flow. In addition, enterprises display all the characteristics and characteristics of a typical cement enterprise and fully disclose data during the research period 2017-2021. This sample of 12 companies is capable of representing the whole population in general, from which it is possible to deduce the characteristics and properties of the whole population.

### 2. PROFITABILITY SITUATION OF LISTED CEMENT ENTERPRISES IN VIETNAM

#### 2.1. Status of operating profitability

The operating profitability indicators of listed cement companies are reflected in Figure 1. The average operating profit ratios of enterprises increased in 2018 and 2019 but then decreased gradually. ROS of Phu Tho Cement Joint Stock Company and Yen Binh Cement Joint Stock Company were negative for 5 consecutive years. ROS of Ban Son Cement Joint Stock Company, Thai Binh Cement Joint Stock Company has many fluctuations. The ROS of the remaining 8 enterprises remained positive in the past 5 years. The increase in average operating profit margin in 2019 was mainly due to the increase in ROS of 7/12 enterprises.

**Figure 1: Operating margin - ROS (%)**

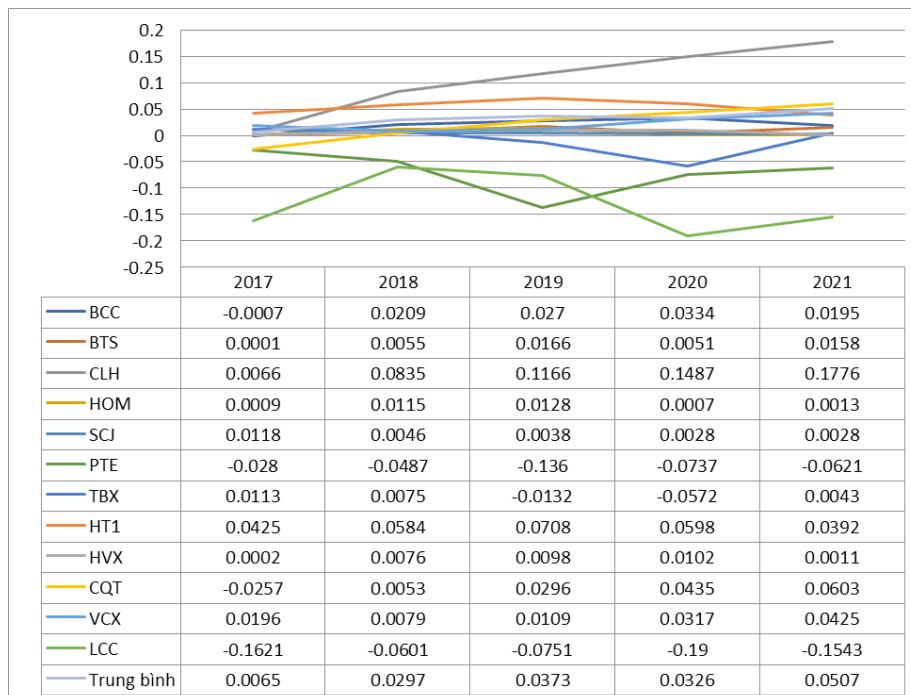


(Source: Calculation from financial statements of listed cement companies in the period 2017-2021)

**2.2. Status of profitability of business capital**

Business capital’s net profitability is shown in Figure 2. It shows similar to net operating margin: Average ROA increased in 2018 and 2019, then gradually decreased in 2020 and 2021. H Double-click to hide white space

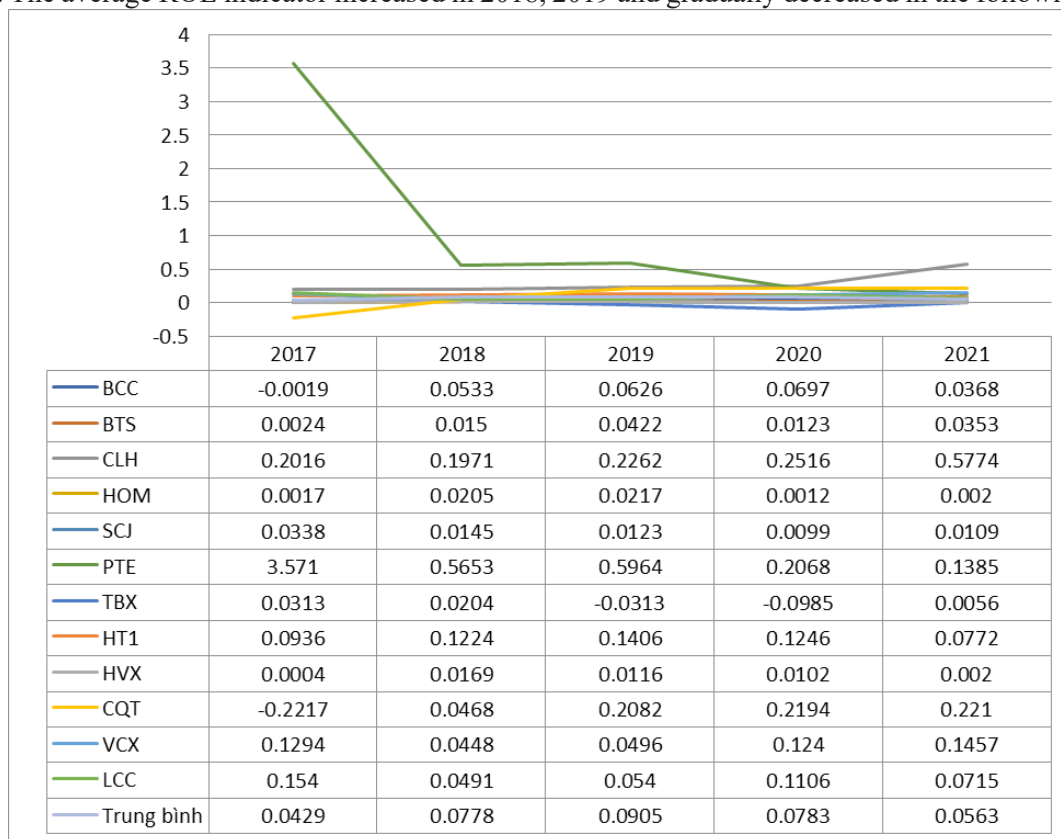
**Figure 2: Dragon profitability ratio of business capital (ROA) of listed cement companies**



(Source: Calculations from financial statements of listed cement companies in the period 2017-2021)

### 2.3. Status of return on equity

The profitability of equity is shown in Figure 3, showing similar as the rate of return on working capital. The average ROE indicator increased in 2018, 2019 and gradually decreased in the following years.



**Figure 3: Return on Equity (ROE) of listed cement companies**

(Source: Calculations from financial statements of listed cement companies in the period 2017-2021)

## 3. FACTORS AFFECTING PROFITABILITY OF LISTED CEMENT COMPANIES IN VIETNAM

### 3.1 Descriptive statistics of variables in the model

The data is collected, aggregated and calculated by the authors from 12 companies in the cement industry in the period from 2017 to 2021.

Table 1 provides the statistical results of the main variables used in the model, including the first group of factors related to the financial characteristics of the enterprise and the second group of factors related to corporate governance. The variables are statistically based on sample size (Obs), mean (Mean), standard deviation (Std.Dev), maximum and minimum value (max-min).

**\*Regarding the dependent variable:** Choose ROE as the dependent variable representing economic efficiency business of the enterprise

**\*Independent variables, including:** Enterprise size, debt ratio, return on sales (ROS), fixed asset investment ratio, revenue growth rate, ratio of receivables from customers, economic growth rate GDP and inflation rate.

**Table 1: Descriptive statistics of the sea**

Variable	Obs	Mean	Std. Dev.	Min	Max
ROE	60	.1451733	.478893	-.2217	3.6599
lnsize	60	13.70102	1.42726	10.12431	16.22061
Hnvc	60	-.5039011	14.60667	-108.8976	9.276977
growth	60	1.01576	.22846	.3553	2.0087
age	60	29	16.01377	11	64
Htsdh	60	.6706283	.1862464	.1808	.9034
ROS	60	-.0391567	.1905739	-1.1227	.0838
Hpt	60	.0714217	.0798278	.0015	.499
GDP	60	.05435	.0194135	.0258	.0708
I	60	.10078	.0020641	.0973	.103
INF	60	.02986	.0064004	.0184	.0354

From the table above, it can be seen that the total number of observations in the model is 60 respectively with a research period of 5 years (2017-2021) and the number of companies studied is 12.

The statistics table shows that the return on equity has a value from -0.2217 to 3.6599, showing that the companies in the selected sample have quite diverse ROE. both profit and loss companies. This is a good factor for regression results because the firms in the sample are highly representative.

In terms of asset size, the average total assets of securities companies is VND 891,820.359 million, showing that listed securities companies have a fairly large scale. The range of total assets of securities companies in the sample is quite wide from 24,942 million dong to 1,079,532 million dong.

Regarding the debt ratio, the average value is -0.5, the highest value is 9.27 and the lowest value is -108.89, showing that there are many companies using debt capital, showing a degree of independence. financial resources are not high, but take advantage of financial leverage to increase profits.

Sales growth rate has an average value of 101, has the highest value is 2.0087 and the lowest is 0.3553 indicating that there is no company with growth rate Negative growth indicates that the company's efforts in increasing sales.

About the rate of investment in Fixed Assets with an average value of 0.67, the highest value 0.9034 and the lowest 0.1808. This shows that the majority of securities companies do not invest in fixed assets much, in line with the business characteristics of the industry.

The ratio of profit after tax to operating revenue ROS, the average value is -0.039, the largest value is 0.0838 and the lowest value is -1.1227, reflecting the performance of securities companies. quite low in the period 2017-2021, however, there are still some observed samples with a fairly high profit-to-sales ratio.

The ratio of receivables from customers has an average value of 0.07, the maximum value is 0.499 and the lowest value is 0.0015, showing that in the period 2017-2021, the rate of customer receivables of cement companies is quite low.

The INF inflation rate has an average value of 0.03, showing that in the period 2017-2021, Vietnam's inflation rate is always at a stable level.

GDP growth rate, with the average value reaching 0.05435, the highest value reaching 0.0708 and the lowest 0.0258.

### 3.2. Pre-testing the model

\* Analyze correlation between variables

**Table 2: Correlation analysis between variables**

	ROE	lnsize	Hnvc	growth	age	Htsdh	ROS
ROE	1.0000						
lnsize	-0.0657	1.0000					
Hnvc	-0.9730*	0.0544	1.0000				
growth	-0.0899	0.2061	0.1002	1.0000			
age	0.1556	0.2695*	-0.1707	0.2830*	1.0000		
Htsdh	0.1658	0.3755*	-0.0838	-0.0187	-0.0449	1.0000	
ROS	-0.0441	0.2638*	0.0915	0.3080*	-0.0044	-0.2035	1.0000
Hpt	-0.1062	-0.6041*	0.0980	-0.0136	-0.2242	-0.5824*	0.0041
GDP	0.0957	0.0315	-0.0898	-0.0174	-0.0132	-0.1201	0.0900
I	-0.1816	-0.0690	0.1999	-0.0637	0.0840	0.0321	-0.0459
INF	0.0927	0.0596	-0.0941	0.0175	-0.0700	0.0031	-0.0031

	Hpt	GDP	I	INF
Hpt	1.0000			
GDP	0.0740	1.0000		
I	-0.1456	-0.0000	1.0000	
INF	0.0660	0.0000	-0.7062*	1.0000

In general, most of the variables in the model are correlated with each other low (less than 0.5). The authors will perform the multi-addition test line through the variance magnification factor VIF

\*Variance magnification factor VIF

**Table 3: Variance Magnification Factor VIF**

Variable	VIF	1/VIF
Hpt	2.33	0.428508
I	2.26	0.442592
lnsize	2.11	0.473072
INF	2.02	0.494403
Htsdh	1.81	0.552022
age	1.39	0.719861
ROS	1.37	0.732571
growth	1.28	0.781599
Hnvc	1.22	0.821405
GDP	1.05	0.952249
Mean VIF	1.68	

Based on the table, it shows that the average VIF of the variables in the model is 1.68, less than 10 and there is no independent variable with VIF index exceeding 10, so there is no strong multicollinearity in the model.

Conclusion: With the standard of exaggeration the variance VIF does not exist multicollinearity in the regression model.

\* OLS model regression

**Table 4: Result of OLS model inquiry**

Source	SS	df	MS	Number of obs	=	60
Model	13.0687665	10	1.30687665	F(10, 49)	=	138.55
Residual	.462207648	49	.009432809	Prob > F	=	0.0000
Total	13.5309741	59	.229338544	R-squared	=	0.9658
				Adj R-squared	=	0.9589
				Root MSE	=	.09712

ROE	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
lnsize	-.0287987	.0128804	-2.24	0.030	-.0546827 -.0029146
Hnvc	-.0315128	.0009551	-32.99	0.000	-.0334322 -.0295934
growth	-.026195	.0626026	-0.42	0.677	-.1519997 .0996096
age	.0010392	.0009306	1.12	0.270	-.000831 .0029093
Htsdh	.4223157	.0913752	4.62	0.000	.2386904 .6059411
ROS	.2591335	.0775187	3.34	0.002	.1033539 .4149131
Hpt	.2356568	.2419696	0.97	0.335	-.2505994 .721913
GDP	.491132	.667445	0.74	0.465	-.8501488 1.832413
I	5.207493	9.207821	0.57	0.574	-13.29632 23.7113
INF	1.726568	2.809615	0.61	0.542	-3.919565 7.372701
_cons	-.3726238	1.040209	-0.36	0.722	-2.463001 1.717754

(Source: The results of the author's performance from Stata 15 software)

From the table, we see that there are 4 statistically significant variables, including: Lnsize, Hnvc, Htsdh, ROS are significant at  $\alpha=5\%$ . In which, Operation time (age), Fixed asset investment (Htsdh), Profit after tax ratio (ROS), Ratio of receivables from customers (Hpt), Interest rate (I), GDP growth Inflation rate (INF) has a positive effect on ROE; specifically, when the variables age, Htsdh, ROS, Hpt, GDP, INF increase by 1%, ROE will increase by 0.001%, respectively; 0.42%; 0.26%; 0.23%; 0.49%; 5.2%; 1.72% and vice versa. Enterprise size variables (Lnsize). Debt ratio (Hnvc), Revenue growth rate (growth) have negative impact on ROE.

The adjustment coefficient  $R^2$  of the regression model with ROE is 9589%, which means that 95.89% of the variation of ROE is explained through the independent variables of the remaining model, 4.11% is explained through other variables. variables outside the model. With the F-statistic = 138.55 corresponding to the p-value = 0.0000, the model is statistically significant.

\* FEM-REM . Regression

\* Estimating the Fixed effect- FEM model

**Table 5: Estimating the FEM model**

ROE	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lnsize	-.0288775	.012976	-2.23	0.031	-.0549819	-.0027732
Hnvc	-.0315772	.0009616	-32.84	0.000	-.0335117	-.0296428
growth	-.0063984	.0656899	-0.10	0.923	-.1385494	.1257527
age	.0009262	.0009377	0.99	0.328	-.0009601	.0028126
Htsdh	.4089679	.0921724	4.44	0.000	.223541	.5943948
ROS	.2517974	.0782217	3.22	0.002	.0944356	.4091592
Hpt	.1980308	.2447516	0.81	0.423	-.294346	.6904075
GDP	.4923406	.6691654	0.74	0.466	-.8538465	1.838528
I	0	(omitted)				
INF	0	(omitted)				
_cons	.1992437	.1906427	1.05	0.301	-.1842799	.5827673
sigma_u	.02147689					
sigma_e	.09735899					
rho	.04640397	(fraction of variance due to u_i)				

Fixed-effects (within) regression  
 Group variable: year  
 R-sq:  
 within = 0.9656  
 between = 0.9656  
 overall = 0.9654  
 corr(u\_i, Xb) = -0.0695  
 Number of obs = 60  
 Number of groups = 5  
 Obs per group:  
 min = 12  
 avg = 12.0  
 max = 12  
 F(8,47) = 164.93  
 Prob > F = 0.0000  
 F test that all u\_i=0: F(4, 47) = 0.54  
 Prob > F = 0.7043

The results show that, the FEM model has 4/10 seas that are statistically significant with 5% significance level, including: Insize, Hnvc, Htsdh.

ROS Comments: Prob > F=0.7043, so the OLS model is more suitable than the model. FEM model - Estimation results of Random effect- REM model



**Table 6: Estimation results of Random effect-REM model**

Random-effects GLS regression	Number of obs	=	60
Group variable: year	Number of groups	=	5
R-sq:	Obs per group:		
within = 0.9655	min =		12
between = 0.9731	avg =		12.0
overall = 0.9658	max =		12
	Wald chi2(10)	=	1385.46
corr(u_i, X) = 0 (assumed)	Prob > chi2	=	0.0000

ROE	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
lnsize	-.0287987	.0128804	-2.24	0.025	-.0540437 -.0035536
Hnvc	-.0315128	.0009551	-32.99	0.000	-.0333848 -.0296408
growth	-.026195	.0626026	-0.42	0.676	-.1488939 .0965038
age	.0010392	.0009306	1.12	0.264	-.0007848 .0028632
Htsdh	.4223157	.0913752	4.62	0.000	.2432236 .6014079
ROS	.2591335	.0775187	3.34	0.001	.1071997 .4110673
Hpt	.2356568	.2419696	0.97	0.330	-.238595 .7099086
GDP	.491132	.667445	0.74	0.462	-.817036 1.7993
I	5.207493	9.207821	0.57	0.572	-12.83951 23.25449
INF	1.726568	2.809615	0.61	0.539	-3.780177 7.233313
_cons	-.3726238	1.040209	-0.36	0.720	-2.411395 1.666148
sigma_u	0				
sigma_e	.09735899				
rho	0	(fraction of variance due to u_i)			

The results show that the Rem model has 4/10 seas that are statistically significant with the level The highest significance is 2.5%.

**Table 7: Selection results between REM model and OLS model**

Breusch and Pagan Lagrangian multiplier test for random effects

$$ROE[\text{year},t] = Xb + u[\text{year}] + e[\text{year},t]$$

Estimated results:

	Var	sd = sqrt(Var)
ROE	.2293385	.478893
e	.0094788	.097359
u	0	0

Test: Var(u) = 0

chibar2(01) = 0.00  
 Prob > chibar2 = 1.0000

Comment: Prob > chibar2 = 1.0000 shows that the OLS model is more efficient than the model REM

**3.3 Regression model results analyzing the influence of factors**

**Table 8: Summary of research results on factors affecting the ability profitability of cement businesses**

STT	Variable name	Encode	Expectation sign	Regression results
1	Business size Karma	lnsize	+	-
2	Debt ratio	Hsn	-	-
3	Profit-to-Revenue Ratio	ROS	+	+
4	Investment rate of Finance fixed assets	Htsdh	+	+

5	Growth rate revenue	Growth	+	Meaningless statistical
6	Receivable ratio client	Hpt	+	Meaningless statistical
7	Growth rate economy	GDP	-	Meaningless statistical
8	Inflation rate	INF	-	Meaningless statistical

From the estimation results, the regression model measures the degree of dynamics of the factors to the return on equity (ROE) of securities companies as follows:

$$ROE = -0.37 - 0.029 * Lsize - 0.03 * Hnvc + 0.42 * Htsdh + 0.26 * ROS + e$$

For firm size: The estimated results show that the beta = -0.029 (with 1% significance level) indicates the firm size. Have negative relationship with ROE. This result is contrary to the hypothesis that the authors set go out. Specifically, when the size of the business increases by 1 unit, it will make the ROE down 0.029. During the period from 2020, the business of The cement industry faces many difficulties due to recent market movements adverse factors affecting the efficiency of cement exports such as: high cost of logistics; Coal (input fuel) price increases continuously... resulting in negligible profit.

For debt coefficient: The results show that the debt coefficient has beta = -0.03 (with 1% significance level) showing that HSN has a negative relationship with ROE. This result is similar to the hypothesis proposed by the authors. Specifically, when HSN increases by 1 unit, ROE will decrease by 0.03 units. Enterprises have not made good use of financial leverage, reducing revenue, leading to a decrease in profitability on equity. This means that if a business has a higher debt-to-assets ratio, it will operate less efficiently. Because if the enterprise uses a high ratio of bank loans, the pressure to pay interest and principal is larger, the more difficult it will be for the business to operate. Therefore, the debts that businesses should strengthen are those with less pressure to pay interest and principal as they still occupy from suppliers.... Only then will businesses take full advantage of debt to improve business performance.

For the ratio of investing some fixed assets: The estimated result has bet 0.42, shows that the ratio of investment in fixed assets has a positive relationship with ROE. Result This is similar to the proposed hypothesis. Specifically, when Htsdh increases by 1 unit, it will causes the ROE value to increase by 0.42 units. It can be seen that, if the investment in fixed assets (equipment of fixed assets, improvement of technology, etc.) A well-executed business will increase the operational efficiency of the business.

For the profit-to-sales ratio: the estimated result has beta = 0.26, showing that the profit-to-sales ratio has a positive relationship with ROE, this result is similar to the hypothesis proposed by the authors. . Specifically, when ROS increases by 1 unit, it will make ROE increase by 0.26 units respectively.

In summary, after analyzing the results of the regression model of factors affecting the profitability of equity of listed cement manufacturing companies, it can be seen that there are four main factors affecting to ROE is Enterprise Size (Lsize). Debt ratio (Hnvc). Fixed Asset Investment Ratio (Htsdn), Return on Sales (ROS). Factor Growth Rate (Growth). Customer Payable Ratio (Hpt). Economic Growth Rate (GDP), Inflation Rate (1) does not work. affect the return on equity of the cement manufacturing companies listed in Vietnam.

#### 4. SOME SUGGESTIONS

From the above studies, the authors have some suggestions as follows: Regarding capital sources: Focusing on building a target capital structure in listed cement companies in Vietnam and diversifying forms of capital mobilization, actively building plans to raise business capital for cement enterprises.

Regarding the management of capital use: For reserve raw materials to maintain stable production and business activities of enterprises, the reserve is necessary. However, cement businesses need to determine the appropriate reserve level with the supply and focus on analyzing and forecasting the market situation of raw materials supply to adjust the reserve level in accordance with the current situation. market variables.

For finished products in reserve: it is inevitable to become a finished product. Enterprises It is necessary to build stock norms of finished products in accordance with the market demand and supply and the competitiveness of each enterprise.

Regarding promotion of consumption: promote market research to anticipate growth, choose means of transport in the consumption process, strengthen activities to support consumption promotion, strengthen close links with regional and world cement associations and participate in conferences and forums to update trends: review expenditures, energy consumption norms, build new and consistent norms to ensure stability. determine product quality with the central goal of optimizing the operation of the equipment ,..

About business cost management: research on the use of raw materials replacement in production to ensure energy saving and cost savings at the same time non-input materials and transportation costs.

## **5. CONCLUSION**

Cement enterprises play a very important role in creating jobs, increasing incomes for workers, providing cement products to meet the construction needs of national key projects, construction works. infrastructure construction of factories, offices, schools, houses,... contributing to the achievement of the country's socio-economic development goals. However, in the context of increasingly competitive fiercely between domestic enterprises and foreign enterprises, the cooperative enterprises are facing many difficulties in the process of operation. Business performance is low and unstable. Therefore, the article has focused on researching on the profitability of cement enterprises in order to properly assess the profitability of enterprises, thereby proposing appropriate solutions and recommendations.

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## PROFIT DISTRIBUTION OF STATE ENTERPRISE CURRENT SITUATION AND ISSUES

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**ABSTRACT:** *Using a sample of 10 State-owned enterprises including financial enterprises and non-financial enterprises. The article has briefly analyzed the business performance and profit distribution of 10 state-owned enterprises in the period 2017-2021. The results show that the distribution of profits depends on many different factors such as: industry, profit achieved, future goals, regulations of the State,... These help us assess the achievements, limitations and causes of each limitation that enterprises face in business activities as well as profit distribution. Thereby, we have an overview of SOEs in general from which to propose solutions to improve profits and improve the distribution of profits.*

**Keywords:** *profit distribution, profits, state-owned enterprises*

### 1. INTRODUCTION

In today's market economy, profit has become a business purpose, a decisive factor for the survival and development of enterprises. Profit is the most effective economic lever, the top goal and the ultimate goal that all businesses reach. And more importantly, the realization of the profit target is an important condition to ensure the firm's financial position.

Maximizing profit is the ultimate destination that any business that wants to survive and develop in the current new conditions must aim for. Profit is an aggregate quality indicator that reflects the results of production and business activities of an enterprise. Thereby, it shows whether the implementation of the profit distribution regime is effective or not and whether it is a driving force to stimulate the rise in competition of each enterprise.

Today, it can be seen that Vietnamese enterprises, when transforming into a market economy, have achieved remarkable achievements but also encountered many difficulties in improving profits. To be able to maintain and ensure profits and distribute profits reasonably, businesses need to set up plans, development orientations and set out specific measures suitable to business conditions. and adapt to the market. Recognizing the importance of profits and profit distribution for the growth of enterprises, the research topic "Profit distribution of Vietnamese State-owned enterprises" was selected for the purpose of clarifying the nature of the business. The nature and origin of profits in the market economy, an overview of the situation of production and business activities and profit distribution of enterprises.

### 2. THEORETICAL FRAMEWORK

#### 2.1. Profit

Each historical period, each social mode, profit is understood in different ways. That is the subject of debate of many economic theorists, of many development schools. From the early stages of the commodity economy, until the market economy developed at a high stage, production and exchange of goods on the

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market were mainly affected by the law of value, the law of supply and demand, the law of competition. The feudal mode of production disintegrated, changed to the capitalist mode of production, and the production and circulation of goods developed. Profit always plays an important role, which is the goal that any enterprise can achieve. are aimed at, are the conditions for the existence and development of enterprises.

Classical economists before Marx said: “The dominant part lies in the selling price over the cost of production called profit”.

According to Marx: “The surplus value or the excess in the total value of the commodity, in which the surplus or unpaid labor of the worker has been materialized, I call profit.”

Modern economists say: “The difference between the total income and the total costs of the enterprise in a given period is profit”.

It can be said that, although the above views are different, they all think that profit is an excess compared to the cost spent. That is the nature of profit in a market economy.

According to the corporate finance textbook of the Academy of Finance, the concept of profit is that after a cycle of production and business activities, enterprises will be able to earn a profit, which is the difference between revenue and expenses. the costs incurred by the enterprise to obtain that revenue from its activities during a given period.

The general formula for determining profit:

$$\text{Profit} = \sum \text{Revenue} - \sum \text{Expense}$$

In there:

**Total revenue:** is the total amount that will be received from the sale of products, provision of services, financial activities and other activities of the business.

**Total expense:** is the amount of money to be paid to carry out economic activities such as production, transaction, ... in order to buy all kinds of goods and services necessary for the production and business process.

## 2.2. Profit distribution

Profit distribution is not the distribution of profits in a single week, but rather the aggregate settlement of economic relations taking place for enterprises. The correct distribution will become the driving force of production. business development, creating favorable conditions for enterprises to continue their business and vice versa.

The profit distribution process of the enterprise must meet the following basic requirements:

Enterprises need to harmonize the relationship of interests between the State, enterprises and employees in enterprises. This relationship is reflected in the corporate income tax rate and the rate of setting up bonus and welfare funds of the enterprise.

The profit distribution process must ensure a balanced relationship between accumulation and consumption, between simple business reproduction and expanded business reproduction. This relationship is reflected in the rate of setting up corporate funds, in which the profit to reinvest in production and business activities is adequately focused.

In fact, with State-owned enterprises, the distribution of profits is made according to the regulations of the State and in each period. Specifically, state-owned enterprises shall distribute profits according to the provisions of Article 31 of Decree 91/2015/ND-CP, Article 2 of Decree 32/2018/ND-CP, Clause 4, Article 4 of Circular 36/ 2021/TT-BTC:

Profits of state-owned enterprises, after making up for losses of the previous year in accordance with the Law on Corporate Income Tax, deducting the Science and Technology Development Fund in accordance with law, paying corporate income tax, profits The remaining profits are distributed in the following order:

1. Divide the profits to the partners contributing capital in accordance with the provisions of the signed economic contract (if any).
2. Offsetting the loss of previous years has expired before being deducted from profit before tax according to regulations.
3. The remaining profit after deducting the above amounts will be distributed in the following order:
  - + Deduction for special funds under the Prime Minister’s decision (if any).
  - + Deduct up to 30% into the enterprise’s development investment fund.
  - + Deducting bonus and welfare funds for employees in the enterprise.

### 3. DATA AND RESEARCH METHODS

#### 3.1. Research data

Research data is collected from annual financial statements, resolutions of the Annual General Meeting of 10 SOEs for the period 2017 - 2021. Specifically, 10 SOEs include 3 banking enterprises (enterprises). financial enterprises) and 7 production and business enterprises (non-financial enterprises). The information needed for the research is collected from audited financial statements, annual reports, notes to financial statements.

#### 3.2. Research methods

Applying the method of dialectical materialism to research and understand problems scientifically in the unified movement of a material whole along with the objective impact of external factors on the general. By surveying methods of profit distribution to assess the current status of profits and profit distribution of Vietnamese state-owned enterprises, combined with some other methods such as analysis, comparison, summarization, etc. Collecting data, interpreting inductively, etc. to show from overview to details the distribution of profits. Besides, the study also uses and selectively applies research results of scientific works. relevant quality studies to strengthen and deepen the thesis’s points.

### 4. RESULTS AND DISCUSSION OF RESULTS

#### 4.1. Overview of corporate profits for the period 2017-2021

##### 4.1.1. Financial enterprise

**Table 4.1: Profit after tax of financial enterprises 2017-2021**

*Unit: million dong*

No	Businesses	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021
1	VCB	8.849.164	14.454.667	18.200.952	18.043.745	21.190.934
2	CTG	6.717.522	5.193.214	9.283.297	13.278.707	13.622.346
3	BID	6.945.586	7.541.833	6.945.586	7.223.565	10.841.271

*(Source: Synthesis of the project’s authors from the financial statements)*

The above table has generalized the profits of 3 banking enterprises in the group of financial enterprises in the period 2017-2021, specifically:

The bank with the highest profit is Vietcombank, then Vietinbank and finally BIDV. Each year the highest profit growth between years is different: 2018 (VCB - 63.35%), 2019 (CTG - 78.76%), 2020 (CTG - 43.04%), and 2021 (BIDV - 50.08%). Although the year-on-year growth of each bank is not too regular, the profit is still

positive and higher than the industry average. With the change in the ranking order of the amount achieved and the level of profit growth, but all 3 banks kept their positions in the top of the highest income state-owned banks.

Not only that, the fact that all three banks achieved high profits has contributed to increasing the proportion of the State-owned commercial banks in the money market. As of September 30, 2021, the total assets of State-owned commercial banks reached VND 6,209,729 billion, accounting for 41.2% of the whole system; charter capital reached 169,690 billion dong, accounting for 23.7%. The above figures partly show the leading role of the system of state-owned commercial banks in the money market. Asset quality of the whole system also improved positively; This is reflected in the ratio of bad debt on the balance sheet of the whole system at 1.63% at the end of 2019. However, the Covid-19 pandemic has reduced the ability of customers to pay debts, thereby affecting the bad debts of customers banks in 2020 and 2021. However, the bad debt ratio on the balance sheet of the whole system is still kept under the threshold of 3%.

In addition to the positive profit growth, financial enterprises, especially the banking sector, also faced many difficulties that affected their profits. Below is an overview of the profits of each bank including: Vietcombank, Vietinbank and BIDV

#### 4.1.2. Non-financial enterprise

**Bảng 4.2 : Profit after tax of non-financial businesses 2017 - 2021**

*Unit: Millions*

No	Businesses	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021
1	GAS	9.937.792	11.708.565	12.085.651	7.971.791	8.851.812
2	PLX	3.911.662	3.649.759	4.676.561	1.252.572	3.123.734
3	POW	2.601.688	2.286.841	2.879.956	2.662.666	2.052.153
4	TNC	26.753	27.193	36.062	54.898	39.269
5	EVF	180.409	203.576	229.452	228.409	330.571
6	BCM	-	1.002.494	1.923.183	904.919	1.356.901
7	HVN	1.911.095	2.417.897	2.899.344	(8.734.154)	(11.833.362)

*(Source: Synthesis of the project's authors from the financial statements)*

The above table has generalized the profits of 7 state-owned enterprises belonging to the group of non-financial enterprises in the period 2017-2021. With the same group, but the business fields are different, the profits of enterprises compared to each other also have differences. So these 7 enterprises can be classified into oil and gas groups and the rest. Specifically:

Oil and gas group: The company with the highest profit is GAS, followed by PLX and finally POW. This group also has irregular growth (interlaced increase and decrease). Year by year, the highest growth rate will be in 2018 (Gas - 17.82%), in 2019 (PLX - 28.13%), In 2020 (POW - 7.54%) and in 2021 (PLX - 149.39%). Compared to the level of profit, the oil and gas group is only close to a quarter of the profit when compared to the banking industry.

The remaining group of companies: The profit achieved is quite low compared to the financial sector and the oil and gas group. This group also has unstable profit growth like the oil and gas group with years of increase, years of decline. Year by year, the highest growth rate will be in 2018 (HVN - 26.52%), in 2019 (BCM - 91.84%), in 2020 (TNC - 52.23%), in 2021 (BCM - 49), 95%). Despite the unstable growth, companies including: Thong Nhat Rubber Joint Stock Company, Power Finance Joint Stock Company, Investment and Development Corporation still kept positive profits. Particularly, Vietnam Airlines Corporation has a negative profit (-11,833,362 million dong in 2021), which means that the company's growth will be negative.

#### 4.2. Status of profit distribution of enterprises in the period 2017-2021

**4.2.1. Financial enterprise**

**Bảng 4.3: Total distributed profits of state-owned financial enterprises from 2017 to 2021**

*Unit: VND million*

No	Items	Vietcombank	Vietinbank	BIDV
1	Total PAT from 2017 to 2021	80.739.462	48.072.226	35.439.235
2	Allocation to a Supplementary charter capital reserve	4.042.769	1.985.861	1.769.243
3	Allocation to Financial reserve	8.085.540	4.807.223	3.538.487
4	Allocation to bonus and welfare fund	9.874.111	9.682.557	9.059.900
5	Dividend paid by stock	11.348.000	10.823.000	12.527.562

*(Source: Synthesis of the project's authors from the financial statements)*

The above table has provided an overview and overview of the total profit and profit distribution of the banking group (financial group) from 2017 to 2021. For each year, banks have different profits in the high year and the year. short. Therefore, the amount set aside for the funds will be different between banks. However, the funds of all three banks are set aside at the same rate: the reserve fund for supplementing charter capital 5%, the financial reserve fund 10%, the bonus and welfare fund will comply with regulations. regulations of the State for enterprises rated A (all three banks are class A enterprises).

For dividend payment in cash and shares, each bank also has different ratios, so the payment amount will also be different, but after 5 years all three banks have increased their charter capital. According to the table, the largest increase in charter capital belonged to BIDV - 12,527,562 million VND, then Vietcombank - 11,348,000 million VND and finally Vietinbank - 10,823,000 million VND. To have a more detailed view of the difference in profit distribution of the three banks, it is necessary to analyze the profit distribution plan of the three banks.

**4.2.2. Non-financial enterprise**

**Table 4.4: Total distributed profit of state non-financial enterprises in the period 2017 - 2021**

*Unit: VND Billion*

No	Items	GAS	PLX	POW	TNC	EVF	BCM	HVN
1	Total PAT from 2017 to 2021	49.635	13.416	12.267	199,3	1.172	4.499	(3.237,6)
2	Average allocation for funds 2017 - 2021							
	- Bonus and Welfare Fund, Management Board	269,46	13,764	-	36,62	-	1,525	-
	- Bonus and Welfare	-	7,98	47,4	-	53,2	125,75	395,6
	- Management bonus fund	-	4,568	-	-	-	-	1,12
	- Development Fund	1.956,4	-	104,2	2,4	-	333	-
	- Reserve fund for additional charter capital	-	-	-	-	58,6	-	-
	- Financial provision fund	-	-	-	-	117,2	-	-
	- Science and technology development fund	-	-	141,8	-	-	-	-
3	Average dividend payout 2017 - 2021	7.005,2	2.621,6	6.964,4	28,2	185,6	643,25	480
	- Average dividend payout ratio	36,6%	22%	10,6%	14,7%	8%	6,25%	3,6%

*(Source: The authors calculate and synthesize from the profit distribution plan of non-financial enterprises)*

Table 4.2 gives us an overview of the profit distribution of non-financial SOEs through various items. The above results also show that in the 5-year period from 2017 to 2021, all businesses achieve a stable profit after tax in the first 3 years, however, because each business faces difficulties in each field. During the Covid-19 pandemic, there are industries that show a decrease in profits, and there are industries where profits are not affected too much.



And because each business has different profit distribution plans, the funds that businesses set out will also be different. On average, when deducting the bonus and welfare fund, the Management Board of financial enterprises is still unstable, specifically, while GAS deducts VND 269.46 billion, BCM deducts VND 1,525 billion. For bonus and welfare funds, HVN deducted the most with the amount of 395.6 billion dong, which shows that during the epidemic period, HVN was affected quite a lot but still used profit after tax for reward work. encourage material benefits, serve the needs of public welfare, improve and enhance the material and spiritual life of employees. Besides, PLX criticized VND 7.98 billion for this fund. The investment and development fund cannot fail to mention GAS when this enterprise has deducted 1,956.4 billion dong here, this shows that the enterprise is increasingly expanding production, business, innovating and replacing machinery. equipment, facilities and applying more scientific and technical advances to promote profits, on the contrary, TNC criticized 2.4 billion dong.

Each company has a different dividend payment plan, but it can be clearly seen that the average dividend in these 5 years depends on the profit after tax of the enterprises.

### **4.3. Achievements and limitations**

#### **4.3.1. Achievement**

##### *a. Financial enterprise*

In the period 2017-2021, all three banks achieved many successes in business activities as well as affirmed their position in the industry. At the same time, profitable business was not only completed but exceeded the set plan, helping each bank to distribute profits to ensure operational capacity, dividend payment activities, capital raising activities, etc.

All three banks have implemented profit distribution principles including: Realized profit principle; Principle of net profit; Principles of ensuring solvency and distribution of profits to ensure the harmony of interests between entities (owners, the State, employees, ..)

The bank's coordination of principles aims to ensure the harmony of interests between the entities but still ensure the solvency, and at the same time, towards the long-term benefit of sustainable development.

Banks all set aside similar funds, including reserve fund to supplement charter capital of 5% compared to EAT, financial reserve fund of 10%, bonus and welfare fund. In addition, BIDV also set aside a reserve fund for investment development (in 2017) with the provisioning rate of 35%.

Regarding dividend payment, each bank has its own level of dividend payment depending on the profit after tax achieved by the enterprise. During this period, VCB had the highest dividend payout among the three banks at 12% (actually) 4% higher than the plan. Meanwhile, the highest dividend payment rate of Vietinbank is 5%, BIDV is 8%. The above cash dividend payment can also be understood because VCB's NPAT is many times higher than that of the other two banks: Vietinbank (1.5 times higher in 2021), BIDV (3.2 times higher than last year). 2021).

Regarding capital increase, from 2017 to 2021, the order of capital sources of banks has changed. In 2017, the leader was Vietinbank (VND 37,234 billion), then Vietcombank (VND 35,977 billion) and then BIDV (VND 34,187 billion). But after 5 years and up to the present time, the rank of charter capital has changed. Specifically, BIDV has risen to the leading position (50,585 billion VND), ranked second is Vietinbank with charter capital of 48,058 billion VND and ranked third in the group is Vietcombank with charter capital of 47,325 billion VND. copper.

To sum up, by effectively applying the principles of profit distribution and complying with the State's regulations on profit distribution in accordance with personal circumstances and social contexts in each year, it has helped for all 3 banks to successfully complete and exceed the set plans. Bring benefits as well as maintain its position in the market, contributing to the economy of Vietnam.

*b. Non-financial enterprise*

□ **Oil and gas industry group**

In recent years, the world in general and Vietnam in particular have faced many difficulties and challenges, affecting all aspects of the economy, including the oil and gas industry. Crude oil prices are constantly fluctuating, leading to impacts on the prices of gas, petroleum products and oil and gas supply chains... This becomes even more difficult, specifically in the context of the world facing the Covid pandemic. -19. The structure of primary energy is tending to change strongly, in the direction of greening, developing clean energy, and reducing carbon emissions.

With internal factors affecting profit distribution such as the staff of PLX, GAS and POW with management capacity, high sense of responsibility, modern professional working style, and sensitivity to developments. change of reality, have a long-term strategic vision, and promptly issue reasonable decisions.

Regarding dividend payment, each oil and gas enterprise has its own level of dividend payment depending on the profit after tax achieved by the enterprise. But it can be seen that PLX, GAS and POW all have a fairly high dividend payout ratio of 30%, however, for POW, the dividend payment level gradually decreases over the years and reaches 2% in 2020.

In addition, the application of science and technology to the practice of construction investment and production and business activities of PLX, GAS and POW has left many outstanding achievements, helping to form the gas industry infrastructure today. more complete and has made great contributions to the strong development of the oil and gas industry. Contributing to ensuring national energy and food security as well as making great contributions to the state budget and socio-economic development.

□ **Manufacturing industry group**

Over the years, manufacturing enterprises have continuously expanded their production and business activities and promoted international integration, affirming their position and brand in the world. As a result, Vietnam's manufacturing industry has achieved high rankings in the world, with the output and exports for many consecutive years ranked third in the world. The above results were achieved thanks to the right orientations and clear directions of the businesses, which helped the profits of enterprises to increase rapidly and achieve impressive numbers. The development of the economy along with the process of world economic integration, the constantly fluctuating movements of the market, like other groups of industries, the manufacturing sector also faces many difficulties in operation. businesses due to the impact of the epidemic, but overcoming those difficulties, businesses have achieved certain results as follows.

In the period from 2017-2020, Thong Nhat Rubber's profit after tax has increased every year, showing that its business activities are very profitable. During the covid pandemic, the company still achieved good business results compared to the industry average. In 2020, EVN Finance's pre-tax profit is VND 285.7% billion, completing 102% of the year plan.

Electricity Joint Stock Finance Company has achieved many achievements in business activities and earned quite good profits. The company's profit after tax has generally increased year by year, profit before tax has always exceeded the initial plan.

Cost management can also be considered relatively good, although most of the cost indicators have increased, the increase is due to objective impacts, due to the general fluctuations of the global economy. demand, causing input prices to rise, it does not exclude a single firm. Besides, the increase in costs here is also due to the increase in production volume of the Company compared to the previous year. The management and use of capital is relatively efficient and economical, especially fixed capital. Besides, wages and incomes of workers are constantly increasing.

#### □ **Aviation industry group**

In general, all businesses doing business in Vietnam have a common advantage that is operating in a stable and sustainable political environment. The system of legal documents on business fields is more and more complete, creating favorable operating conditions as well as a legal corridor for commercial businesses as well as businesses operating in other fields.

According to a forecast by the International Air Transport Association (IATA), the world aviation market will recover beyond its pre-Covid-19 level in early 2024, with the total number of passengers expected to reach 4 billion. ; The domestic market will recover sooner. Vietnam's domestic market is forecasted to recover at 96%.

#### **4.3.2. Limit**

##### *a. Financial enterprise*

Besides the achievements that banks have achieved, all three banks have certain limitations.

Firstly, demand deposits (CASA) will still increase, but the proportion of CASA in total deposits will not be as high as before.

Secondly, raising capital also faces many difficulties, depending on many factors. For example, Vietcombank has proposed to increase charter capital, but it will not be approved and completed until 2020.

Third, the competition of banks in digital transformation projects and diversification of products and services. In the context of integration and technology development, the competitive pressure of the banking industry is increasingly fierce

Finally, there is a risk of network security, safe data information.

##### *b. Non-financial enterprise*

#### □ **Oil and gas industry group**

The oil and gas industry also has some problems, especially for the application of science and technology to increase in oil and gas prospecting, exploration and production activities. Oil and gas exploration and exploitation activities will become increasingly difficult due to the decline of the reserves of key fields, and limited exploitation of open blocks...

Besides the difficult factors and consequences caused by the Covid-19 epidemic affecting the economy and businesses, PLX, GAS and POW also have to face new developments, that is, the geopolitical situation in the world. The world is unstable due to the impact of the Russia-Ukraine conflict, volatile energy markets and global financial policies (supply chain disruptions, supply shortages, escalating prices, high inflation, high prices, etc.) oil, LPG prices are high...)

#### □ **Manufacturing industry group**

Besides the achievements, the manufacturing industry still has limitations that need to be improved. Profits of some companies in the industry have not been effective for a few years due to many factors, thereby making business operations difficult.

#### □ **Aviation industry group**

The first solution can be mentioned is to increase revenue. The effective selection and use of capital helps the Company increase revenue, save costs, and above all increase profits. The Company needs to accurately determine the regular minimum capital requirements necessary for the Company's production and business activities.

Next, reducing costs is also considered an effective solution. The company needs to have reasonable sales and trade credit policies to reduce customer receivables to a moderate rate, the occupied capital is not too large, affecting production activities as well as increasing turnover. capital round.

Some other solutions can also be considered such as training to improve the professional skills of employees

#### *\* General limitations in profit distribution of Vietnamese State-owned enterprises*

The assessment of 10 typical SOEs helps us to see that Vietnamese SOEs have contributed greatly to the country's economy. Each enterprise has achieved certain achievements in production and business activities as well as in the profit distribution process with strict compliance with the regulations set forth by the State. Besides, each business also has some limitations in profit distribution. Faced with this fact, the authors have summarized the general limitations that state-owned enterprises in general and 10 state-owned enterprises under study in particular are facing, specifically:

Firstly, because state-owned enterprises have to comply with many complicated regulations and administrative procedures, the financial management process is often very slow, causing a cash surplus that is not used effectively.

Second, some Vietnamese State-owned enterprises do not provide complete and accurate profit information to shareholders and the public, making people distrust and unwilling to invest in these enterprises.

Third, SOEs often have priority in receiving financial support and other benefits from the government, so they are not highly competitive, which also affects the distribution of profits.

Fourth, lack of diversification of products and services, some Vietnamese State-owned enterprises mainly operate in a number of fixed fields, do not diversify products and services, making profit distribution difficult. uneven and dependent on a number of areas.

Fifthly, with difficulties in debt recovery, state-owned enterprises, especially the banking sector, have difficulty in recovering debts from partners, affecting the profits of enterprises. severely affected.

In summary, the limitations in profit distribution at Vietnamese SOEs can have a great impact on the development of enterprises and the country's economy. Addressing these limitations and providing solutions is necessary for Vietnamese State-owned enterprises to develop stronger and more sustainably in the future.

#### **4.4. General solution to improve profit distribution of Vietnamese State-owned enterprises**

State-owned enterprises are an important milestone in Vietnam's economic development. However, the issue of profits and profit distribution of SOEs is still facing many challenges. To solve this problem, it is necessary to have a common solution to improve profits and improve profit distribution of Vietnamese SOEs. Solutions to improve profitability include:

One of the most important solutions is to improve management capacity and improve the efficiency of production and business activities. This can be achieved by investing in modern technology and equipment, increasing professional staff training and improving administrative capacity. Businesses also need to look

for opportunities to expand markets and diversify products and services, strengthen brand promotion to attract customers.

Second is to step up the equitization and sale of capital in enterprises where the State does not need to hold or hold controlling shares; even businesses that are doing business effectively. Completing the mechanism for assessing land, tangible and intangible assets (intellectual property, brand, etc.) in equitization according to market principles, removing barriers in the equitization process corruption is corruption, “group interests”, the entrenched state of power of the SOE board of directors.

Third, strengthen financial management including cost management, cash flow, investments and liabilities. Strengthen risk management to minimize risks related to finance, investment, production, market and logistics. This helps to optimize profits and increase the competitiveness of enterprises.

Fourth, to speed up the debt settlement, divestment, and equitization of SOEs in an efficient, public and transparent manner; have a mechanism to monitor, detect and promptly handle violations during the implementation process. Strengthen inspection and supervision of capital use process at SOEs. Completely handle loss-making and inefficient projects, ensuring the principles of publicity and transparency, according to the market mechanism and the provisions of law. The State does not invest or supplement capital from the state budget in loss-making and inefficient projects. The handling by forms of dissolution or bankruptcy must ensure the highest interests of the State and the legitimate interests of employees and investors.

The fifth is to strengthen the management of the distribution system to ensure that products are delivered to consumers quickly and efficiently, increase market access and increase revenue and profit.

Sixth is to apply a modern technology foundation, innovation capacity, and management according to international standards to improve the operational efficiency and competitiveness of SOEs. There is a mechanism to encourage research, development and application of advanced science and technology to production and business activities and management and supervision of enterprises. Implement digital transformation, promote publicity and transparency of financial information, and enhance corporate accountability. To develop a number of state-owned economic groups with large scale, efficient operation, and regional and international competitiveness in a number of key industries and fields of the economy.

For perfecting profit distribution, SOEs need to research and apply reasonable profit distribution strategies, including optimizing costs and enhancing production and business efficiency. At the same time, it is necessary to strengthen monitoring and evaluation of business activities to ensure fairness and transparency in profit distribution.

Define profit distribution goals and establish clear distribution plans to ensure fairness and transparency. This plan should include methods of distributing profits to stakeholders and within the business.

Strengthen financial management to ensure the highest profit and optimize profit distribution. This includes revenue management, cost management and risk management.

Building an effective management and internal control system. This system will help ensure fairness and transparency in the profit distribution process. Enterprises need to have a clear profit distribution policy, detailed financial plan and regulations on risk management. In addition, enterprises need to have an internal control department to monitor and protect the interests of related parties.

Consider important factors when distributing profits, including stakeholder contribution, workload, results, and importance of each project and business.

Enterprises need to enhance transparency in the profit distribution process, including disclosing

information about business results, costs and profit distribution to stakeholders, helping to increase transparency and ensure the integrity of the company. equity in the distribution of profits.

Enhance competitiveness and improve labor productivity. This will help businesses increase profits and reduce production costs, thereby providing suitable solutions to distribute profits. These solutions can include improving production processes, investing in new technologies, improving labor productivity, and increasing training and human development.

In summary, raising profits and perfecting profit distribution of Vietnamese SOEs is a process that requires constant focus and efforts from enterprises. However, with common solutions such as improving governance capacity, investing in modern technology and equipment, diversifying products and optimizing costs, Vietnamese SOEs can achieve The goal is to improve profits and improve profit distribution efficiently.

## 5. CONCLUSION

The research topic has given general theories on business efficiency and profit distribution of 10 state-owned enterprises in Vietnam, including 3 financial enterprises and 7 non-financial enterprises. In particular, the research team has generalized the business situation and analyzed specifically the profit distribution of each enterprise, the subjective and objective factors affecting the distribution of profits such as the type of industry. of the enterprise, the size of the enterprise, the level of profit achieved, the distribution principle, the form of dividend payment, the capital increase plan, the macroeconomic policy of the State,... In addition, the working group The author has collected data by conducting a real survey on the distribution of profits of each enterprise in the period 2017 - 2021, proving their impact according to the proposed theory and hypothesis. The research team has pointed out the achievements, limitations and causes for each group of enterprises, thereby concluding the general limitations that State-owned enterprises are facing in production and business activities, especially in the process of classifying enterprises. profit distribution. Thereby, the research team proposes specific solutions for each enterprise in particular and SOEs in general in order to improve business efficiency and improve profit distribution.

## 6. APPENDIX

### APPENDIX 1: LIST OF 10 STATE ENTERPRISE OF VIETNAM

No	Company name	Ticker symbol	Stock exchange	Listing day	Type of company
1	Bank for foreign trade of Vietnam- Vietcombank	VCB	HOSE	30/06/2009	Joint stock commercial bank
2	Bank for Industry and Trade of Vietnam - Vietinbank	CTG	HOSE	16/07/2009	Joint stock commercial bank
3	Bank for Investment and Development of Vietnam - BIDV	BID	HOSE	21/01/2014	Joint stock commercial bank
4	Vietnam Gas Corporation	GAS	HOSE	21/05/2012	JSC
5	Vietnam National Petroleum Corporation	PLX	HOSE	21/04/2017	JSC
6	PetroVietnam Power Corporation	POW	HOSE	14/01/2019	JSC
7	Thong Nhat Rubber Joint Stock Company	TNC	HOSE	22/08/2007	JSC
8	Electricity Joint Stock Finance Company	EVF	UPCoM HOSE	08/2018 12/01/2022	JSC
9	Investment and Development Corporation	BCM	HOSE	31/08/2020	JSC
10	Vietnam Airlines Joint Stock Company	HVN	UPCoM HOSE	07/05/2017 07/05/2019	JSC

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16. Resolution of GAS's Annual General Meeting from 2017 to 2021
17. Resolution of PLX's Annual General Meeting from 2017 to 2021
18. Resolution of POW's Annual General Meeting from 2017 to 2021
19. Resolution of TNC's Annual General Meeting from 2017 to 2021
20. Resolution of EVF's Annual General Meeting from 2017 to 2021
21. Resolution of BCM's Annual General Meeting from 2018 to 2021
22. Resolution of HVN's Annual General Meeting from 2017-2021

## CAPITAL RAISING BY ISSUING BONDS OF LISTED CONSTRUCTION ENTERPRISES IN VIETNAM

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**ABSTRACT:** *Corporate bonds are a significant source of funding for companies in Vietnam. The corporate bond market in Vietnam has grown rapidly over the years, with the issuance of corporate bonds increasing significantly in recent times. In this paper, we will analyze the factors that influence the decision of construction enterprises in Vietnam to issue corporate bonds and the regulatory environment for the issuance of corporate bonds. The theoretical framework is based on two main theories: the factors that influence the decision of companies to issue corporate bonds and the regulatory environment for the issuance of corporate bonds. The research method involves a comprehensive literature review of academic articles, reports, and regulatory documents related to corporate bonds in Vietnam. The findings suggest that companies issue corporate bonds to finance operations, expand their business, and reduce reliance on bank loans. However, the decision to issue corporate bonds is influenced by various factors, including the company's financial performance, market conditions, and the regulatory environment. The regulatory environment for the issuance of corporate bonds in Vietnam is complex and involves multiple stakeholders, including the State Securities Commission, the Ministry of Finance, and the Vietnam Bond Market Association. The paper concludes by highlighting the importance of addressing the regulatory challenges and promoting transparency and investor confidence in the corporate bond market in Vietnam.*

**Keywords:** *raise capital, corporate bonds, factors, regulatory environment.*

### I. INTRODUCTION

The construction industry is a key sector of the Vietnamese economy, accounting for a significant portion of the country's GDP and employment. However, the sector faces various challenges, including a lack of funding sources and transparency in financial reporting. One potential solution to these challenges is the issuance of corporate bonds by construction enterprises. This paper analyzes the factors that influence the decision of construction enterprises in Vietnam to issue corporate bonds and the regulatory environment for the issuance of corporate bonds.

Corporate bonds refer to debt securities issued by corporations to raise funds for their business activities. These bonds are typically issued with a fixed interest rate and a maturity date. The interest rate is usually higher than that of government bonds as corporate bonds are riskier. The maturity of corporate bonds typically ranges from one to ten years. Corporate bonds can be issued in various denominations, depending on the issuer's needs. The corporate bond market in Vietnam has grown rapidly in recent years, with the issuance of corporate bonds increasing significantly. This growth has been fuelled by the need for companies to raise funds to invest in their business activities and expand their operations.

The corporate bond market in Vietnam has been growing rapidly over the years. Based on the Asian Development Bank research, the corporate bond market in Vietnam grew by 29.4% in 2019, reaching a total value of VND 212.2 trillion (approximately USD 9.1 billion). In 2020, the corporate bond market in Vietnam continued to grow, with the total value of corporate bonds issued reaching VND 280 trillion (approximately USD 12.2 billion). The growth of the corporate bond market in Vietnam has been driven



by several factors, including the need for companies to raise funds to invest in their business activities and expand their operations, as well as the low-interest-rate environment in Vietnam.

Given the rapid growth of the corporate bond market in Vietnam, it is important to analyze the market to understand its dynamics, the risks and opportunities associated with investing in corporate bonds, and the regulatory framework governing the market. This research aims to provide a comprehensive analysis of the corporate bond market in Vietnam, including the risks and opportunities associated with investing in corporate bonds, the regulatory framework governing the market, and the factors that are driving the growth of the market.

Our position on the corporate bond market in Vietnam is that it is a significant source of funding for companies in Vietnam. However, investing in corporate bonds carries certain risks, including credit risk, interest rate risk, and liquidity risk. Investors need to understand these risks and conduct thorough due diligence before investing in corporate bonds. Additionally, the regulatory framework governing the corporate bond market in Vietnam needs to be strengthened to ensure the protection of investors and the stability of the market.

## **II. THEORETICAL FRAMEWORK**

### **Factors influencing the decision of companies to issue corporate bonds.**

Several factors influence a company's decision to issue corporate bonds. The first factor is the company's financial needs. If the company needs to raise funds quickly and cannot obtain a bank loan or other financing, issuing corporate bonds may be a viable option. The second factor is the cost of capital. If the cost of issuing corporate bonds is lower than other financing options, the company may choose to issue bonds. The third factor is the market demand for the company's bonds. If there is high demand for the company's bonds, the company can issue bonds at a lower cost and raise more funds. The fourth factor is the credit rating of the company. If the company has a good credit rating, it can issue bonds at a lower cost than a company with a lower credit rating.

According to a study by Nguyen and Tran (2018) that construction enterprises in Vietnam often require significant capital investment to finance their projects. These projects may have a long gestation period, and the company may not have sufficient cash flows to finance the project. In such cases, issuing corporate bonds can be an attractive option. The construction enterprise can raise funds quickly and use the funds to finance the project. Additionally, issuing corporate bonds can help the company diversify its sources of funding and reduce its reliance on bank loans (Vietnam Briefing, 2021).

The cost of capital is an essential factor for companies considering issuing corporate bonds. The cost of issuing bonds includes the interest rate paid to bondholders and the fees paid to underwriters. If the cost of issuing bonds is lower than other financing options, the company may choose to issue bonds. In Vietnam, the interest rates for corporate bonds are generally higher than bank loans, but the cost of issuing bonds can be lower than equity financing. The cost of capital can also depend on the credit rating of the company. (Myers C, 1977).

### **Regulatory environment for the issuance of corporate bonds in Vietnam**

The regulatory environment for the issuance of corporate bonds can significantly impact a company's decision to issue bonds. Regulations can affect the cost of issuing bonds, the market demand for the bonds, and the credit rating of the company.

The regulatory framework for corporate bonds in Vietnam is governed by the Law on Securities and the regulations issued by the State Securities Commission (SSC). The SSC is responsible for regulating and supervising the issuance of corporate bonds in Vietnam. The SSC requires companies to meet certain criteria before they can issue bonds. These criteria include having a minimum credit rating, a positive net worth, and a good financial track record. Companies must also disclose information about their financial position and the risks associated with the bonds to investors. Moreover, the regulatory authorities in Vietnam, such as the State Securities Commission and the Ministry of Finance, play an important role in the issuance of corporate bonds. These authorities are responsible for ensuring that the issuance of bonds complies with the legal framework and that investors are protected from fraudulent activities.

In addition, the regulatory environment can significantly impact a company's decision to issue bonds. If the regulatory requirements are too stringent, companies may find it difficult to meet the criteria and issue bonds. This can limit the number of issuers in the market and reduce the liquidity of the market. On the other hand, if the regulatory requirements are too lax, it can increase the risk of default and reduce investor confidence in the market. In Vietnam, the regulatory environment for corporate bonds has been evolving to strike a balance between investor protection and promoting the development of the market.

### **III. RESEARCH METHOD**

The research methodology for this paper involved a literature review and case studies. The literature review examined academic articles, reports, and regulatory documents related to corporate bond issuance in Vietnam. The case studies involved analyzing the bond issuance activities of selected construction enterprises in Vietnam. The case studies focused on the factors that influenced the companies' decision to issue bonds, the regulatory environment for bond issuance, and the impact of bond issuance on the companies' financial performance.

#### **Literature review**

The literature review focused on academic articles and regulatory documents related to corporate bond issuance in Vietnam. The review examined the factors that influenced companies' decisions to issue bonds, the regulatory environment for bond issuance, and the impact of bond issuance on companies' financial performance. The review found that the cost of capital, financial needs, market demand, and credit rating were the primary factors that influenced companies' decisions to issue bonds. The review also found that the regulatory environment for bond issuance in Vietnam had been evolving to promote investor protection and market development.

#### **Cost of Capital and Regulatory Environment**

The literature review found that the cost of capital was a critical factor for companies considering issuing bonds. The cost of issuing bonds includes the interest rate paid to bondholders and the fees paid to underwriters. In Vietnam, the interest rates for corporate bonds are generally higher than bank loans, but the cost of issuing bonds can be lower than equity financing. The review also found that companies with a good credit rating could issue bonds at a lower cost than companies with a lower credit rating. Furthermore, Research has shown that the cost of capital for bond issuance in Vietnam is lower than equity financing. According to a study by the Vietnam Institute for Economic and Policy Research (VEPR), the average cost of capital for bond issuance in Vietnam was 7.5% in 2019, compared to 13.5% for equity financing. This is because bondholders have a fixed claim on the company's assets and earnings, and they are paid before equity holders.

The regulatory environment for the issuance of corporate bonds in Vietnam requires companies to meet certain requirements before they can issue bonds. These include credit rating requirements, disclosure requirements, and other regulatory requirements. Companies must obtain a credit rating from a recognized credit rating agency, and the rating must meet the minimum requirement set by the MOF. In addition, companies must disclose certain information to investors, including the use of proceeds, risks associated with the investment, and financial information about the company. Failure to comply with these requirements can result in penalties or legal action.

### **Case Studies**

The case studies analyzed the bond issuance activities of selected construction enterprises in Vietnam. The case studies found that the companies issued bonds to finance their projects, diversify their sources of funding, and take advantage of favourable market conditions. The case studies also found that the companies considered the cost of capital, market demand, and credit rating when deciding to issue bonds.

The case studies also examined the regulatory environment for bond issuance in Vietnam. The companies found the regulatory requirements reasonable and complied with the regulations set by the SSC. The companies also found the regulations helpful in promoting investor protection, market transparency, and reducing the risk of default.

To further understand the factors that influence the decision of construction companies in Vietnam to issue corporate bonds and the impact of the regulatory environment on bond issuance, we will examine the experiences of four construction companies in Vietnam: Song Da Corporation (SIG), Vietnam Construction and Import-Export Joint Stock Corporation (VCG), Construction Corporation No. 1 (CCI), and FECON Joint Stock Company (FCN).

#### **a) Song Da Corporation (SIG)**

SIG is a state-owned construction company in Vietnam that has issued corporate bonds to finance its projects. In 2019, SIG issued VND 1.5 trillion (\$64.4 million) worth of bonds, with a tenor of five years and a coupon rate of 7.5%. The bonds were rated A+ by Vietnam Credit Rating Joint Stock Company (VCR), which is the second-highest rating in Vietnam. SIG was able to issue bonds at a lower cost of capital compared to bank loans, which allowed the company to reduce its financing costs and improve its financial position.

#### **b) Vietnam Construction and Import-Export Joint Stock Corporation (VCG)**

VCG is a state-owned construction company in Vietnam that has also issued corporate bonds to finance its projects. In 2019, VCG issued VND 1.1 trillion (\$47 million) worth of bonds, with a tenor of five years and a coupon rate of 7.5%. The bonds were rated A by VCR, which is the third-highest rating in Vietnam. VCG was able to issue bonds at a lower cost of capital compared to bank loans, which allowed the company to reduce its financing costs and improve its financial position.

#### **c) Construction Corporation No. 1 (CCI)**

CCI is a state-owned construction company in Vietnam that has issued corporate bonds to finance its projects. In 2020, CCI issued VND 1.3 trillion (\$55.9 million) worth of bonds, with a tenor of five years and a coupon rate of 7.4%. The bonds were rated A- by VCR, which is the fourth-highest rating in Vietnam. CCI was able to issue bonds at a lower cost of capital compared to bank loans, which allowed the company to reduce its financing costs and improve its financial position.

**d) FECON Joint Stock Company (FCN)**

FCN is a private construction company in Vietnam that has issued corporate bonds to finance its projects. In 2019, FCN issued VND 150 billion (\$6.4 million) worth of bonds, with a tenor of three years and a coupon rate of 10%. The bonds were rated B+ by VCR, which is the sixth-highest rating in Vietnam. FCN was able to issue bonds at a lower cost of capital compared to bank loans, which allowed the company to reduce its financing costs and improve its financial position. However, FCN faced some challenges in issuing bonds due to the regulatory environment. The company had to meet the requirements set by the MOF and the SSC, which included obtaining a credit rating and disclosing certain information to investors. FCN also had to compete with other companies in the bond market, which made it difficult to raise the funds it needed.

This case study also analyzed the impact of bond issuance on the companies’ financial performance. The companies found that bond issuance helped them raise capital quickly and efficiently. The companies also found that bond issuance helped them diversify their sources of funding and reduce their reliance on bank loans. However, the companies also noted that bond issuance increased their debt levels and interest expenses, which could impact their financial performance in the long term.

**IV. RESULTS AND DISCUSSION**

**Results**

The number of construction companies on the stock exchange reaches more than 70 companies. To understand more about the situation of construction enterprises’ capital mobilization, we have collected and analyzed data from 4 listed construction companies based on their financial reports. As these companies are medium and large enterprises in the sector, the selection of data samples allows us to evaluate the construction sector and have an overview of the current market in Vietnam.

1. Song Da Corporation (SJG)
2. Vietnam Construction and Import-Export Joint Stock Corporation (VCG)
3. Construction Corporation No. 1 (CC1)
4. FECON Joint Stock Company (FCN)

From data gathering, we have integrated and put out our results to reflect the current capital mobilization by issuing bonds from the listed construction enterprises in Vietnam as the following:

**Table 1: Current capital raising of 4 companies**

Sông Đà Corporation	2019		2020		2021	
	VND (billion)	%	VND (billion)	%	VND (billion)	%
I. Liabilities	20,400,846	72.9	18,883,330	72.48	17,072,093	69.86
1. Current Liabilities	12,560,551	44.89	12,173,642	46.72	10,381,592	42.48
2. Long-term Liabilities	7,840,395	28.02	6,709,688	25.75	6,690,501	27.38
3. Corporate bonds issue	1,033,382	3.69	1,040,000	3.99	680,000	2.78
II. Equity	7,582,079	27.1	7,170,572	27.52	7,365,017	30.14
1. Owner’s Equity	7,582,045	27.1	7,170,538	27.52	7,364,982	30.14
2. Funding and others	35	0	35	0	35	0
3. Non-controlling Interest	2,503,525	8.95	2,528,462	9.7	2,429,680	9.94
Construction Corporation No.1 (CC1)	2019		2020		2021	
	VND (billion)	%	VND (billion)	%	VND (billion)	%

I. Liabilities	8,606,136	82.44	8,037,270	81.3	9,814,924	81.64
1. Current Liabilities	6,137,974	58.8	5,708,857	57.75	5,506,340	45.8
2. Long-term Liabilities	2,468,162	23.64	2,328,413	23.55	4,308,584	35.84
3. Corporate bonds issue	-	0	298,055	3.01	2,260,555	18.8
II. Equity	1,833,195	17.56	1,848,580	18.7	2,207,459	18.36
1. Owner's Equity	1,833,195	17.56	1,848,580	18.7	2,207,459	18.36
3. Non-controlling Interest	-	0	377,457	3.82	412,237	3.43
Total Capital	10,439,331	100	9,885,850	100	12,022,383	100
Vietnam Construction and Import-Export (Vinaconex) (VCG)	2019		2020		2021	
	VND (billion)	%	VND (billion)	%	VND (billion)	%
I. Liabilities	11,580,050	59.94	12,446,776	63.47	23,341,791	75.37
1. Current Liabilities	7,722,679	39.98	8,992,486	45.86	15,470,241	49.95
2. Long-term Liabilities	3,857,371	19.97	3,454,290	17.61	7,871,550	25.42
3. Corporate bonds issue	-	0	700,000	3.57	4,685,718	15.13
I. Liabilities	7,738,321	40.06	7,163,205	36.53	7,627,625	24.63
1. Current Liabilities	7,630,406	39.5	7,052,572	35.96	7,526,762	24.3
2. Long-term Liabilities	107,914	0.56	110,633	0.56	100,863	0.33
3. Corporate bonds issue	942,612	4.88	800,933	4.08	1,007,629	3.25
Total Capital	19,318,371	100	19,609,981	100	30,969,416	100
FECOR Corporation	2019		2020		2021	
I. Liabilities	3,191,628	56.59	4,277,200	63.08	4,566,523	60.92
1. Current Liabilities	2,803,785	49.71	3,896,088	57.46	3,365,480	44.9
2. Long-term Liabilities	387,842	6.88	381,112	5.62	1,201,043	16.02
3. Corporate bonds issue	279,187	4.95	-	0	-	0
II. Equity	2,448,413	43.41	2,502,914	36.92	2,929,181	39.08
1. Owner's Equity	2,448,413	43.41	2,502,914	36.92	2,929,181	39.08
3. Non-controlling Interest	255,830	4.54	287,590	4.24	274,711	3.66
Total Capital	5,640,041	100	6,780,114	100	7,495,704	100

Table 2. Accountability Structure

Sông Đà Corporation	2019		2020		2021	
	VND (billion)	%	VND (billion)	%	VND (billion)	%
Short-term and lease liabilities	5,325,421	42.4	5,195,425	42.7	4,634,835	44.6
Appropriation Account	7,235,129	57.6	6,978,217	57.3	5,746,756	55.4
Short-term liabilities	12,560,550	100	12,173,642	100	10,381,591	100
Long-term and lease liabilities	7,373,309	94	6,363,107	94.8	5,434,411	81.2
Appropriation Account	466,985	6	346,581	5.2	1,256,090	18.8
Corporate bonds issue	1,033,382	13.2	1,040,000	15.5	680,000	10.2
Long-term liabilities	7,840,294	100	6,709,688	100	6,690,501	100
Vietnam Construction and Import-Export (Vinaconex) (VCG)	2019		2020		2021	
	VND (billion)	%	VND (billion)	%	VND (billion)	%
Short-term and lease liabilities	2,219,609	28.7	2,140,720	23.8	5,047,334	32.6
Appropriation Account	5,503,070	71.3	6,851,765	76.2	10,422,906	67.4

Short-term liabilities	7,722,679	100	8,992,485	100	15,470,240	100
Long-term and lease liabilities	2,442,077	63.3	2,146,351	62.1	6,632,043	84.3
Appropriation Account	1,415,293	36.7	1,307,939	37.9	1,239,507	15.7
Corporate bonds issue	-	0	700,000	20.3	4,685,718	59.5
Long-term liabilities	3,857,370	100	3,454,290	100	7,871,550	100
Construction Corporation No.1 (CC1)	2019		2020		2021	
	VND (billion)	%	VND (billion)	%	VND (billion)	%
Short-term and lease liabilities	2,478,101	40.4	2,474,393	43.3	2,319,019	42.1
Appropriation Account	3,659,872	59.6	3,234,464	56.7	3,187,320	57.9
Short-term liabilities	6,137,973	100	5,708,857	100	5,506,339	100
Long-term and lease liabilities	1,744,221	70.7	1,674,645	71.9	3,624,790	84.1
Appropriation Account	723,940	29.3	653,767	28.1	683,794	15.9
Corporate bonds issue	-	0	298,055	12.8	2,260,555	52.5
Long-term liabilities	2,468,161	100	2,328,412	100	4,308,584	100
FECON Corporation	2019		2020		2021	
	VND (billion)	%	VND (billion)	%	VND (billion)	%
Short-term and lease liabilities	753,922	26.9	1,220,446	31.3	1,331,632	39.6
Appropriation Account	2,049,863	73.1	2,675,642	68.7	2,033,847	60.4
Short-term liabilities	2,803,785	100	3,896,088	100	3,365,479	100
Long-term and lease liabilities	379,581	97.9	374,528	98.3	1,140,623	95
Appropriation Account	8,261	2.1	6,584	1.7	60,420	5
Corporate bonds issue	279,187	72	-	0	-	0
Long-term liabilities	387,842	100	381,112	100	1,201,043	100

## Discussion

### Analysis

Based on the theoretical framework and case studies, we can analyze the factors that influence the decision of construction companies in Vietnam to issue corporate bonds and the impact of the regulatory environment on bond issuance.

**Financial Needs:** Construction companies in Vietnam require a significant amount of capital to finance their projects, and issuing corporate bonds is one way to raise funds. The funds raised through bond issuance can be used to finance new projects, refinance existing debt, or for working capital purposes. The case studies show that construction companies in Vietnam have successfully used bonds to raise funds and improve their financial position.

**Cost of Capital:** The cost of capital for bond issuance in Vietnam is lower than equity financing, and this has incentivized companies to issue bonds. The case studies show that construction companies in Vietnam were able to issue bonds at a lower cost of capital compared to bank loans, which allowed them to reduce their financing costs and improve their financial position.

**Regulatory Environment:** The regulatory environment for the issuance of corporate bonds in Vietnam has a significant impact on the decision of companies to issue bonds. The regulatory framework sets out the rules and requirements for bond issuance, including credit rating requirements, disclosure requirements, and other regulatory requirements. The case studies show that companies had to meet these requirements to issue bonds, and failure to comply could result in penalties or legal action. However, the regulatory environment has also helped to protect investors and ensure the stability of the bond market.

**Data collection results**

Besides Song Da Corporation, the overall total capital is growing steadily. Similarly, enterprises such as FCN or VCG tend to increase the proportion of capital mobilized from outside and reduce capital mobilized from within; SJG, on the contrary, reduces external capital and increases internal capital. The capital structure has been relatively stable over the years, with the debt/equity ratio has always maintained the same level of 30/70 (SJG), 20/80 (CC1), and 40/60 (FCN), despite VCG this relative structural fluctuation when shifting from 40/60 in 2019 to 30/70 in 2021. Thus, all four companies in the selected sample are characterized by relatively high debt ratios, stable capital structure, capital size, not too much fluctuation, and use corporate bonds to mobilize capital and finance business activities.

**Accountability structure:**

From Table 2, we can see that short-term debt is accountable for a large share. However, it tends to decline in the period from 2019-2020. In addition, the capital appropriated in the total accountability structure is about 39-49%. As for the balance of capital appropriated, only SJG recorded positive growth in the same period. From that, it reflects in production and business expansion, model enterprises' debt structure tends to increase in terms of long-term debts gradually and is less likely to appropriate additional capital.

**Regarding the situation of corporate bond issuance by enterprises:**

Although all four enterprises have high debt ratios, the amount of debt raised from corporate bonds is uneven in size and structure. In particular, the lowest is FECON, which only raised very little from bonds and paid off the principal in 2019, then in 2020 and 2021 did not issue any new bonds at all. SJG maintained stable borrowing from sealants in the 3-5% range. Only VCG and CC1 have sharply increased corporate bond issuance during the study period when the capital raised from this channel accounted for over 50% of the total long-term debt. This shows that in the sample of four enterprises mentioned above, those with lower debt ratios and trending down tend not to issue or issue very few corporate bonds. As for enterprises with high debt ratios that tend to increase, the index of corporate bond issuance accounts for a large part. However, issuing bonds will put payment pressure on businesses heavier than other forms of debt mobilization. Therefore, bond issuance depends on each enterprise's optimal capital structure, use purpose and affordability.

**Determine factors affecting capital mobilization activities from corporate bond issuance:**

There are many factors affecting capital-raising activities from corporate bond issuance. There are even factors coming from enterprises in the same construction industry, such as the default on corporate bonds of Tan Hoang Minh, that have shaken confidence in the safety of bond investors. In addition, there are also unusual factors such as the Covid pandemic, the release of bailouts, and the recovery of cash flow, which has made the money supply of the whole economy in general and construction businesses in general suffer, and it isn't effortless to manage. Here are the factors affecting capital-raising activities from corporate bond issuance:

<b>Deposit interest rates are usually higher than banks.</b>	To entice investors to put money into corporate bonds instead of banks, the interest rate on bonds will usually be more attractive than the interest rate on savings deposits. In addition, due to the fast, convenient, and diversified sources of capital, the interest rate of this mobilization channel is often higher than that of businesses mobilizing from banks. This will put heavy payment pressure on corporations that not all construction businesses can lean on.																								
<b>Complicated legal procedures</b>	The bond issuance process involves a lot of complicated legal procedures, from registering the issue, notifying investors, preparing documents, and negotiating conditions with related parties until the transaction is completed. These difficulties can lead to extended-release times and increased costs for the business. Businesses have to go through many procedures and need time to find investors, which can affect the ability of companies to raise capital quickly, especially when businesses often need money for the project to keep up with the construction schedule.																								
<b>High credit risk and difficulty in bond pricing</b>	<table border="1"> <thead> <tr> <th></th> <th>Current Ration (2021)</th> <th>Quick Ratio (2021)</th> <th>Solvency Ratio (2021)</th> </tr> </thead> <tbody> <tr> <td>SJC</td> <td>1.015</td> <td>0.7902</td> <td>0.0455</td> </tr> <tr> <td>VCG</td> <td>1.3766</td> <td>1.1525</td> <td>0.1818</td> </tr> <tr> <td>FCN</td> <td>1.4848</td> <td>1.2567</td> <td>0.2403</td> </tr> <tr> <td>CC1</td> <td>1.5043</td> <td>1.0104</td> <td>0.0928</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Inherently, the interest rate of bonds will be higher than the interest rate on bank deposits with the same maturity to entice investors. In addition, construction businesses often have low debt solvency, and bond issuance can cause investors to be concerned about credit risk and demand even higher interest rates. This can make the bond valuation of construction businesses more difficult. Too high costs will make firms hesitant to choose this mobilization channel.</p>		Current Ration (2021)	Quick Ratio (2021)	Solvency Ratio (2021)	SJC	1.015	0.7902	0.0455	VCG	1.3766	1.1525	0.1818	FCN	1.4848	1.2567	0.2403	CC1	1.5043	1.0104	0.0928				
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<b>High cost</b>	The cost of issuing bonds includes legal consulting costs, negotiation costs, printing costs, issuance costs, and administration costs. These costs can be a burden for businesses, especially small and medium-sized enterprises. The price is too high compared to the amount of capital to be mobilized, making enterprises consider other forms of mobilization.																								
<b>Unpopular with some investors</b>	Although bond issuance is a popular method of raising capital, not all investors are willing to invest in this type of paperwork. This can make it difficult for businesses to attract professional investors and increase issuance costs. Enterprises may fall into the issuance situation but need more investors to buy bonds, forcing them to mobilize more from other sources to make up for the missing capital.																								
<b>May affect relationships with banks</b>	Suppose construction enterprises regularly issue bonds to raise capital instead of borrowing from banks. In that case, this may affect the relationship between businesses and banks, making it difficult to raise money in the future.																								

### Recommendation

During the research phase, enterprises such as VCG and CC1 generally made great use of the capital-raising channel by issuing corporate bonds, making it one of the primary sources of funding for the company. Therefore, with a policy of governance and reasonable use of capital, the rapid, convenient, and diverse money from this mobilization channel will be a resource that will impact the growth of listed construction enterprises in the coming phase. In addition, timely support from the Government is also necessary to make a significant contribution to improving these construction companies in Vietnam:

First of all, the listed construction enterprise needs to build and strengthen its reputation in the market by improving product and service quality, ensuring transparency, reducing risk, and maintaining relationships



with customers, partners, investors, etc., to attract potential investors. In addition, in the first issuance, it is possible to use corporate bonds with secured assets to build trust with counterparties.

Secondly, the listed construction business needs to improve its financial situation. Companies need to be aware of their financial situation, exercise effective debt control and management to minimize financial risks, enhance their ability to repay the debt to investors and increase business revenue and profitability.

Thirdly, the listed construction business needs to give it a competitive advantage. Companies need to build their differences and competitive advantage over competitors in the industry. This helps attract potential investors.

In the end, listed buildings need to strengthen risk management: Strict risk orientation and direction help credit buildings be highly valued in the market and attract investors. Most enterprises built in Vietnam need to have specific methods or create an effective financial risk management formula for themselves. The enterprise will implement the project, and then control the risk in parallel with the project's progress. This is ineffective because risk management measures must be taken on paper as soon as the project is planned. The absence of specific risk management measures makes it difficult for investors to demand higher interest rates than average, making it difficult to issue corporate bonds.

With the state, government, departments, ministries, and sectors involved:

At first, the state needs to adopt synchronous solutions to improve the business environment of the listed construction enterprise. Improving the business environment helps listed enterprises minimize costs in the process of business production, and improve operational efficiency, thereby improving their solvency and strengthening the confidence and internal potential for the enterprise to issue bonds. A few solutions can be mentioned, such as:

The state needs to promote administrative reforms, improve efficiency and management capacity for listed construction enterprises, and reduce or shorten legal procedures, thus facilitating the implementation of corporate bond issuance policies. With local units, it is necessary to study the establishment of several organizations serving the requirements of market economy development and international economic integration, such as trade promotion centres, centres to promote investment and transfer of technology, etc., to meet the needs of economic development of the construction enterprises on the ground; local authorities also need to continue to facilitate support for the listed building enterprises, such as the planning of the development strategy of the industry, the area as the basis for enterprises to operate, facilitating the area of operation, infrastructure, business locations, etc. The government and its departments, ministries, and industries need to continue to coordinate to maintain a stable economic situation and harmonious coordination between monetary policy and fiscal policy to curb inflation, stabilize exchange rates, and increase the value of the purchasing power of money to create favourable conditions for the production and business activities of listed construction enterprises.

Furthermore, the state should assist in managing corporate finances and financial risks. To support financial risk management for listed construction enterprises, governments must coordinate a comprehensive assessment of financial trouble, thus helping to control the factors that can cause financial risk and finance losses when danger occurs. To help enterprises in the management of financial risks, specialized authorities also need to implement many solutions, such as organizing seminars that help improve awareness and skills in financial risk management, promoting communication of the economic policy to enterprises, fostering the transparency of corporate financial information, and moving towards building a national database on finance. Although the government needs to strengthen the management and supervision of

corporate finance and improve the effectiveness of capital and asset management in the enterprise, it should limit administrative interference, hinder the activity of production, and promote the autonomy and self-responsibility of enterprises. From there, it will be easier for the enterprise to mobilize, allocate, and use financial resources to achieve high efficiency in business production activities, ensure the ability to pay safely, be stable, and choose to issue corporate bonds.

## V. CONCLUSION

In conclusion, this paper analyzed the capital raising activities of construction enterprises in Vietnam through the issuance of corporate bonds, using two frameworks - “Factors influencing the decision of companies to issue corporate bonds” and “Regulatory environment for the issuance of corporate bonds”. The paper found that the cost of capital, financial needs, market demand, and credit rating were the primary factors that influenced companies’ decisions to issue bonds. The paper also found that the regulatory environment for bond issuance in Vietnam had been evolving to promote investor protection and market development.

From our research, we recommend that construction enterprises in Vietnam considering issuing corporate bonds should carefully consider the cost of capital, market demand, and credit rating when making their decisions. The companies should also comply with the regulatory requirements set by the SSC to promote investor protection and market transparency. Finally, companies should carefully manage their debt levels and interest expenses to ensure their long-term financial sustainability.

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## APPLYING Z-SCORE MODEL IN ANALYZING BANKRUPTCY RISK OF HOANG ANH GIA LAI GROUP

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**Mentor: Associate Professor PhD. Vu Van Ninh<sup>1</sup>**

**ABSTRACT:** *In the context of the global financial crisis, Vietnamese businesses in general and Hoang Anh Gia Lai Group in particular are trying to overcome this crisis. Hoang Anh Gia Lai Group, also known as Hoang Anh Gia Lai Joint Stock Company, is a large company with shares listed on the stock exchange. The group has just released its audited consolidated financial report for 2022. The business areas of the group, especially fruits and pork, have brought in large profits but still not enough to cover financial expenses. The group owes Eximbank VND 279 billion due at the end of 2022. The total debt at the end of 2022 reached nearly VND 12.000 billion, including over VND 3.800 billion of payable interest. This is the 6th consecutive year Ernst & Young has doubted the group's ability to continue operations.*

**Keywords:** *financial situation; Hoang Anh Gia Lai Group; Z-Score.*

### 1. INTRODUCTION

In the current context, amidst the strong trend of global economic integration that is happening both in terms of width and depth, especially with Vietnam's participation in important bilateral and multilateral Free Trade Agreements (FTAs), many Vietnamese businesses are facing numerous difficulties and challenges. Alongside the opportunities and advantages that international economic integration brings, Vietnamese businesses need to enhance their financial capabilities in order to survive, compete, and develop. Vietnamese businesses in general, and Hoang Anh Gia Lai Corporation in particular, are constantly trying to overcome this crisis.

In the increasingly fierce and competitive environment, with pressures from massive foreign investment, to maintain profitability and stability, Hoang Anh Gia Lai Corporation must remain dynamic and innovative in business operations. They need to be flexible, seize timely opportunities, continuously innovate and adapt quickly to emerging market demands. Regularly conducting financial research and evaluation will show past and present financial fluctuations, as well as predict future financial risks of the Corporation, helping managers and higher authorities to understand the current financial status and mobilize and utilize financial resources appropriately and effectively.

### 2. THEORETICAL FRAMEWORK

#### 2.1. Overview of research status, research purpose, and scientific significance

##### 2.1.1. Overview of research status

Reference in domestic research works:

(i) Master Hoang Minh Tuan (2020) with the article “Đề xuất một số giải pháp cải thiện tình hình tài chính doanh nghiệp” in Tạp chí Công thương, Volume 22, affirms: Researching the financial situation helps managers clearly see the situation of their own enterprises, including: the situation of increase or decrease,

<sup>1</sup> Academy of Finance.

good and bad aspects of financial situation, business operation situation, capital situation, debt situation, etc. From there, it outlines timely and effective measures and strategies to stabilize the reasonable and strong financial situation, increase asset value for owners.

(ii) The research study “Phân tích các yếu tố ảnh hưởng đến rủi ro phá sản ngân hàng bằng phương pháp Z-score” (2016) by Nguyen Minh Ha and Nguyen Ba Huong analyzed the factors affecting the existence and development of banks using the Z-score method. The research objective was to identify the factors affecting the bankruptcy risk of banks using the Z-score method, and to suggest appropriate policies to enhance the stability and soundness of the operations of the Joint Stock Commercial Bank for Foreign Trade of Vietnam. However, the research did not clearly mention the impact on the bankruptcy risk of production and business enterprises in other industries.

Reference in foreign research works:

(i) In 2006, the book “Key management Ratios, The clearest guide to critical numbers that drive your business” by author Ciaran Walsh discussed important indicators in business management. In the book, the author emphasized the evaluation of business efficiency such as: return on investment, return on total assets, etc. However, the book did not address the specific characteristics of financial statement analysis for the financial situation of enterprises.

(ii) The research “Financial ratios, discriminant analysis and the prediction of corporate bankruptcy” by Edward I. Altman (1968) used multiple discriminant analysis (MDA) based on the combination of multiple factors to develop a model for predicting the risk of corporate bankruptcy.

(iii) The article “Performance implications of strategic performance measurement in financial services firms” published in the journal *Accounting, Organizations and Society* (from pages 715 to 741 - volume 28, year 2003) by authors Christopher D. Ittner, David F. Larcker, and Taylor Randall (from the University of Pennsylvania and the University of Utah in the United States) introduced a system of financial indicators within a strategic financial evaluation system for public companies in the United States.

### **2.1.2. Research purpose and scientific significance**

The most important purpose of studying financial situations is to use financial reports to accurately assess the current situation and potential development of the enterprise, identify the strengths and weaknesses of the enterprise. Therefore, studying financial situations will provide information to users from different perspectives, summarize and comprehensively evaluate financial activities in detail.

Studying financial situations through the financial reports of the enterprise is a concern of many groups of people, such as managers, investors, shareholders, creditors, customers, etc. Each of these groups has different information needs, and the analyses also provide them with certain meanings.

### **2.2. Object and scope of research**

Object of study: Financial situation of the enterprise

Research space scope: Study at Hoang Anh Gia Lai Corporation.

Research time scope: Research mainly during the period from 2017 to 2022.

### **3. RESEARCH METHOD**

Research method: Combining the use of synchronized research methods, including:

### 3.1. Data collection method

The company's financial reports include The balance sheet, Income statement, Cash flow statement, and other reports related to financial activities. The expert method is used to collect data from the board of directors, management, and accounting department through interviews and information exchange.

### 3.2. Data processing method

The comparative method is used to observe the changes in financial situation between research years by using both absolute and relative comparison. Comparing over time is used to identify changes in economic indicators of the company while comparing across space evaluates the position of the unit in the industry and examines the appropriateness of the unit's capital and assets fluctuations.

Statistical method uses statistical data over a long period of time to ensure the stability, long-term and reliability of information.

Statistical analysis is an important method that is always used to synthesize related data and information to generalize and model research factors.

Evaluation method is based on information and data to make comments, conclusions or predictions about financial situation and to identify causes as well as to propose solutions to solve financial problems in the future.

## 4. Z-SCORE BANKRUPTCY RISK COEFFICIENT GROUP

Bankruptcy is a term used to refer to companies that are unable to pay their financial obligations. Bankruptcy is a natural economic phenomenon that eliminates weak businesses under market competition pressure. Predicting the risk of bankruptcy for companies is necessary and practical to reduce risks.

In the world, bankruptcy prediction models have been around for a long time, in which the Z-Score bankruptcy prediction model is widely used. Z-score is a quantitative statistical measure of the distance (measured by standard deviation) from any data point to the average value of a data set. The Z-score is calculated based on five financial indicators combined with weights. The indicators used in the calculation formula are collected from the company's financial reports. The classic Z-score bankruptcy risk coefficient calculation formula is as follows:

$$Z = 1,2 \times +1,4 \times +3,3 \times +0,64 \times +0,999 \times$$

In which:

$$X_1 = \frac{\text{Net working capit}}{\text{Total asset valu}}$$

$$X_2 = \frac{\text{Undistributed profit}}{\text{Average total asset value}}$$

$$X_3 = \frac{\text{EBIT}}{\text{Average total asset value}}$$

$$X_4 = \frac{\text{Book value of equity}}{\text{Book value of total liabilities}}$$

$$X_5 = \frac{\text{Net revenue}}{\text{Average total asset value}}$$

- If  $Z > 2.99$ , the company is classified as a low bankruptcy risk group (SZ);
- If  $1.81 < Z < 2.99$ , the bankruptcy risk of the company is not high, but cannot be excluded (GZ);
- If  $Z < 1.81$ , the company is considered to be at risk of bankruptcy (DZ).

The Z-score model is a model for public companies, specifically for companies that have been listed, belonging to the manufacturing industry group. Adjusting the model for non-listed companies is not scientifically valid. Therefore, an adjustment to the book value of equity will replace market value in variable  $X_4$ . This will change all coefficients of the expression and the classification standards, and the threshold score will also change accordingly. The result of the Z-score model with the new variable  $X_4$  is:

$$Z' = 0.717x + 0.84x + 3.107x + 0.42x + 0.998x$$

In which:

$$X_4 = \frac{\text{Book value of equity}}{\text{Book value of total liabilities}}$$

Because the company is not listed, it means that only the book value of equity should be used for indicator  $X_4$

- If  $Z' > 2.9$ , the company is in a safe zone and has no risk of bankruptcy;
- If  $1.23 < Z' < 2.9$ , the company is in the warning zone and may be at risk of bankruptcy;
- If  $Z' < 1.23$ , the company is in the danger zone, with a high risk of bankruptcy.

In addition, the  $Z''$  index has been developed and adjusted from the Z-score model to be applicable to most industries. The adjustment analyzes the characteristics and accuracy of a model without variable  $X_5$  due to the significant differences in the  $X_5$  indicator among industries. The formula for calculating the  $Z''$  index is adjusted as follows:

$$Z'' = 6.5 \times X_1 + 3.26 \times X_2 + 6.72 \times X_3 + 1.05 \times X_4$$

In which:

$$X_4 = \frac{\text{Book value of equity}}{\text{Book value of total liabilities}}$$

- If  $Z'' > 2.6$ , the company is in a safe zone and has no risk of bankruptcy;
- If  $1.2 < Z'' < 2.6$ , the company is in the warning zone and may be at risk of bankruptcy;
- If  $Z'' < 1.1$ , the company is in the danger zone, with a high risk of bankruptcy.

For this specific model, it is useful in an industry where funding for assets is greatly different among companies and creates important adjustments, such as financial assets not being implemented. In the model for emerging markets, Altman and colleagues added a constant of 3.25 to normalize the score with a score of 0 being equivalent to a D-rated bond (bankruptcy).

## 5. RESULTS AND DISCUSSION

### 5.1. Results

**Table 1. The results of Z-score model of Hoang Anh Gia Lai Group 2017 - 2022**

Targets	2017	2018	2019	2020	2021	2022
NWC (billions VND)	-3.563,2	-6.568,8	-1.016,1	-6.498,6	297,4	-1.179,5
Total Assets (billions VND)	53.062,1	48.111,4	38.632,5	37.265,8	18.439,7	19.798,4
Undistributed Profits (billions VND)	702,8	-36,4	290,8	-6.301,7	-4.467,1	-3.341,0
EBIT (billions VND)	2.015,5	1.580,6	-642,1	-1.097,9	841,3	1.821,4
The stock's market price (thousand VND)	7,35	4,88	3,98	5,25	1,33	9,16
Shares outstanding (million shares)	927,4	927,4	927,4	927,4	927,4	927,4
Total Liabilities (billions VND)	35.274,2	31.300,6	21.823,7	27.238,0	13.766,5	14.603,6
$X_1$	-0,07	-0,14	-0,03	-0,17	0,02	-0,06
$X_2$	0,013	-0,001	0,008	-0,169	-0,242	-0,169
$X_3$	0,04	0,03	-0,02	-0,03	0,05	0,09
$X_4$	0,19	0,14	0,17	0,18	0,09	0,58
$Z''$	0,06	-0,53	-0,08	-1,71	-0,28	0,29

(Source: Financial Statement from 2017 to 2022 and the author's calculation)

If we look at the group of indicators reflecting the financial position of the Group in the past 06 years as analyzed above, it can be seen that these indicators are trending badly, with inconsistent increases and decreases evenly between years. Therefore, the need for a model capable of predicting the bankruptcy risk of enterprises similar to the credit index of famous credit rating organizations in the world such as S&P, Fitch,... is very necessary at present. The Z-score model is such a powerful tool.

Because the subject of the study is Hoang Anh Gia Lai Group, an enterprise that is not in the manufacturing industry and has been listed on the stock exchange. Therefore, based on the Altman Z-score equation, the  $Z''$  coefficient of the Group is determined based on the formula:

$$Z'' = 6,56 \times X_1 + 3,26 \times X_2 + 6,72 \times X_3 + 1,05 \times X_4$$

By collecting Group's financial data between 2017 and 2022 to apply the Z-score model to assess the bankruptcy risk of enterprises, calculate the Z-score of Hoang Anh Gia Lai Group in 2022. Specifically, in which:

$X_1$  is the ratio of net working capital on total assets of the enterprise. This ratio measures the net liquidity of a company's assets relative to its total assets. Net working capital is the remaining balance of short-term assets after being fully financed by short-term debt. Looking at table 1, in 2022, the ratio of working capital to total assets of the company is relatively low and reaches negative 0,06. Because the enterprise has experienced a loss-making period, its working capital is often negative, which shows that the Group is facing difficulties in paying short-term debts because it does not have enough working capital to cover the due debts. This result shows that Hoang Anh Gia Lai Group currently has a funding policy that is not really safe.

$X_2$  is a ratio representing retained earnings on total assets, measured as the ratio of undistributed returns to total assets. This ratio indicates how much retained earnings are generated during the period, reflects the profit or loss of a business enterprise and at the same time, the level of financial leverage of the entity. According to the calculation results, in 2022, the enterprise has this coefficient quite low compared to the industry average, at negative 0,17. This shows that the business is facing profit problems. The company is

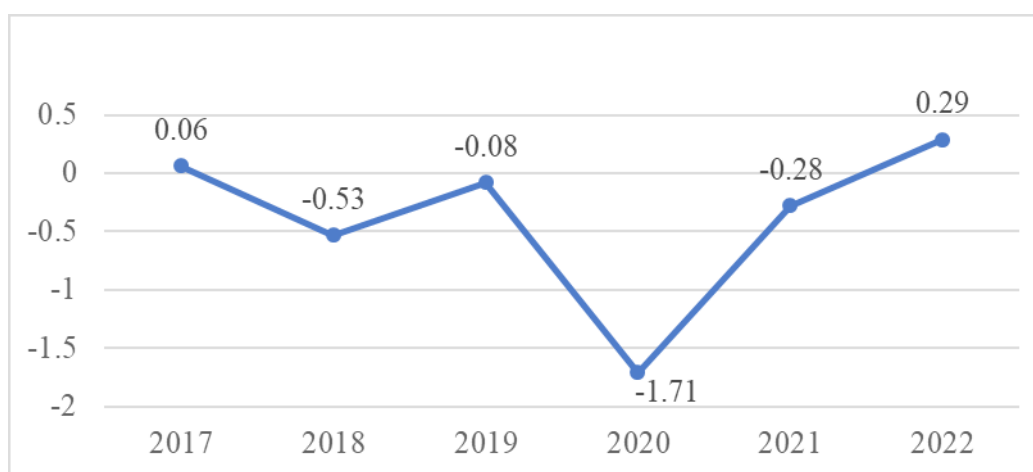


using more debt to finance the capital needs of the business than using retained earnings, thereby increasing the risk of bankruptcy if the unit is unable to meet its debt repayment obligations.

$X_3$  is the ratio of earnings before interest and taxes on total assets. This ratio indicates whether a business's income is sufficient to cover its costs and generate profits. According to the above table, this ratio of the Group will reach 0,09 and will be relatively stable in 2022.

$X_4$  is the market value of equity on total liabilities. This ratio indicates a business's ability to withstand a decline in the value of its assets before the debt becomes too large and makes the business insolvent. This ratio of Hoang Anh Gia Lai Group in 2022 is at a relatively stable threshold, showing that the enterprise has limited the use of a lot of debts to finance its operations and shows the extent to which the market assesses the value of the company. A low market value of equity relative to liabilities will indicate an investor's confidence in the financial strength of the business.

**Chart 1. The results of Z-score model of Hoang Anh Gia Lai Group 2017 - 2022**



(Source: Financial Statement from 2017 to 2022 and the author's calculation)

According to the calculation results of the Z-score for the period 2017 - 2022, Hoang Anh Gia Lai Group has been in a dangerous zone over the years and has a high risk of bankruptcy. The company's Z-score has increased and decreased unevenly between years, this index has dropped sharply from 0,06 (in 2017) to negative 0,53 (in 2018). Then slightly increased in 2019 before bottoming in 2020 at a negative 1,71. A very low Z-score indicates a very high probability of bankruptcy for the company. However, by 2021, this coefficient has tended to increase again and reached the highest mark of 0,29 in 2022. In fact, why has the Z-score of Hoang Anh Gia Lai Group fluctuated so strongly in just 6 years? The root cause of this problem comes from the change of the coefficients  $X_1$ ,  $X_2$ ,  $X_3$ , and  $X_4$ . Specifically:

The  $X_1$  coefficient has always remained at a relatively low level and fluctuated continuously in the 6-year period from 2017 to 2022. Specifically, the decline of this coefficient happens because both average short-term assets and average short-term debt decrease, but the decreasing speed of short-term assets was greater, hence narrowing down the gap between average short-term assets and average short-term debts while the size of the company's assets increased or did not change significantly. In addition, the main reason for the increase of  $X_1$  was the decrease in the average short-term debt, which shows that, during this period, the Group has cut liabilities by a significant amount. This can be considered as a positive change in the policy of the enterprise, reducing the risk of insolvency of due debts.

In general, the coefficient  $X_2$  declined over the years, stemming from the simultaneous drop in the average total assets and retained earnings of the corporation. In addition, the  $X_3$  coefficient also continuously “slided”, mainly because the earnings before interest and taxes of Hoang Anh Gia Lai Group had a substantial decrease, which contributed to the reduction of the company’s Z-score and required the enterprise to take effective measures to improve the financial situation in the coming period.

It can be seen that  $X_4$  is the most influential factor in the formula for calculating the Z-score coefficient. Because of this, a significant decrease of  $X_4$  will cause the speed of Z” to decrease faster. This ratio fluctuates relatively stable around 0,14 – 0,19 over the years, before plummeting to 0.09 in 2021, this “sliding” happens as the corporate’s equity plunged into a period of continuous decline. Then, at the end of 2022, the coefficient  $X_4$  has grown dramatically and reached the milestone of 0,58. This increase is due to a relatively large decrease in the average total debt of the entity while the average equity is almost unchanged or has a slight growth. The main reason why the company’s  $X_4$  is always lower than that of other companies in the same industry is that the company maintains a structure in which total debt is greater than equity, which suggests that the entity uses the appropriation to a large extent. Therefore, HAGL needs to take preventive measures to avoid risks in the future.

## 5.2. Discussion

The Group’s achievements through business results in the period of 2017 - 2022 show:

Inventory turnover ratio tends to decrease from 2,77 rounds in 2017 to 0,84 rounds in 2019, sharply increasing to 3,88 rounds in 2021 and decreasing to 3,42 rounds in 2022. Reduction in inventory ratio helps businesses reduce costs, reduce the burden of working capital in production.

In 2021, the enterprise will mainly focus on two segments of fruit trees and livestock. The area of fruit trees is 10.000 hectares in Vietnam, Laos and Cambodia, of which 7.000 hectares are used to plant bananas (nearly 5 hectares are used in 2021). The Group is targeting the Chinese market as the foundation and will occupy the position of the largest supplier of tropical fruits in this market. The Group focuses on manufacturing products according to Global GAP standards, exporting conditions to fastidious markets such as Japan, Korea, Singapore and Europe.

Regarding livestock, in 2021 there will be 7 clusters and 400.000 pigs for meat. Target 2022, build 9 more clusters (total 16 clusters) and reach 1 million pigs (2.400 sows and 60,000 slaughter pigs each). The pig industry participates from 2020 and 2021, revenue from this segment accounts for a high proportion in the revenue structure.

In 2021, banana-based pig feed can save a third of the total cost of pig production, bringing a gross profit margin of more than 30% for the enterprise’s pig business. Hoang Anh Gia Lai Group plans to expand its pig production scale from 400.000 heads/year in 2021 to 1 million heads/year in 2023. In 2022, Vietnam’s pork supply will grow at a slower rate than meat demand. pigs in Vietnam, due to rising feed costs, plus the ongoing challenge from African swine fever, farmers are reluctant to re-herd. This supply-demand gap will be a factor leading to an increase in pork prices in the short term, thereby supporting the company’s livestock expansion plan.

In 2022, the enterprise’s banana price really increased when China opened up. According to Chairman Hoang Anh Gia Lai, “the current price of bananas is 11 USD/barrel, in the future it will increase to 13 USD/barrel - over the same period this price increased by several tens of %”.

In fact, in 2022, according to the audited consolidated financial statements, HAGL recorded a revenue of VND 5.198 billion - an increase of more than VND 100 billion compared to the independent report

and doubled compared to 2021. Deducting cost of goods, gross profit for the year was 1,173 billion dong, up 131% thanks to good growth in banana and pig sales during the year. In which, revenue from selling pork accounted for 33% (equivalent to VND 1.669 billion), the second largest after the fruit segment with 42% (equivalent to VND 2.150 billion). The gross profit margin of this segment is 24,2%, behind the fruit segment (31,5%).

Net profit after audit decreased by 50 billion VND compared to the previous self-made report, to 1.129 billion VND, due to the increase in selling and administrative expenses. It is expected that by 2023, HAGL expects profit to increase by 20-30%. In which, the momentum is mainly from bananas and new businesses (such as selling vegetables and fruits at BapiFood), which HAGL has determined to be unprofitable.

Besides, there are still some limitations:

Total assets decreased over the years. Total assets in 2017 was VND 209.456 billion, decreasing over the years to 2021 to VND 18.174 billion and reaching VND 19.798,4 billion in 2022. The main reason was due to a decrease in other long-term assets by 98,04% from 15.185 billion to VND 297 billion in 2021. The Group does not have a good policy for creating stability in the structure of short-term assets and long-term assets in the Group's total assets.

Due to the heavy impact of the Covid-19 epidemic, Hoang Anh Gia Lai Group's inventory increased sharply to 1,27 in 2020 and 3,88 in 2021.

Profit after tax has decreased over the years, especially in 2019 the company's profit after tax is negative 1.609 billion dong and in 2020 profit after tax is negative 2.175 billion dong. This change is also reflected in the Return on equity (ROE) in the period of 2017 - 2022, respectively, at 2,23%; 0,04%; negative 10,76%; negative 14,18%; 1,27%; 24,07%. Similar to the Return On Sales ratio (ROS) in 6 years 2017 - 2022 is 7,68% respectively; 0,11%; negative 87,18%; negative 75,01%; 6,08%; 22,01%. The group's Return on Assets (ROA) had a sharp decrease in 2017 of 0,7% after 2 years, falling to negative 3,76% in 2019 and negative 6,17% in 2020 and increasing in the next 2 years when reaching 6,10%. This shows that the company has had improper investment development strategies to improve the group's operations over the years.

The capital structure of the group is not really appropriate, the group borrows a large proportion. The debt ratio of the group has always remained at a high level of over 55%, showing that the financial safety level of the group is not high, the group still has to rely heavily on external capital.

The total capital turnover of the Group fluctuates from year to year, but within 6 years from 2017 to 2022, the total turnover of capital is always greater than 0 and less than 1, from which it can be seen that the capital use stage of the enterprise has not been effective in the last 6 years.

The company's profit after tax decreased to negative VND 1.609 billion in 2020 while the cost of goods sold and selling and corporate expenses increased. Therefore, the enterprise has not yet taken measures to reduce costs to increase profits.

Thus, in the two years of 2021 and 2022, the company's financial situation, although there have been positive signals, has positive growth, but has not reached a safe level, and business performance is not really good. The Group needs to continue to make adjustments to make appropriate and timely decisions for further development in the future.

## **6. RECOMMENDATIONS**

Based on using, analyzing, and evaluating the data on the financial statements of Hoang Anh Gia Lai Group, thereby clarifying the results achieved such as reduced inventories, expansion of the pig industry,

and increased revenue from banana production. The Group is also actively moving towards products that meet Global GAP standards to satisfy demanding markets such as Japan, Korea, Singapore, and Europe. In addition, there are also some limitations such as long-term debt and unsecured equity to finance long-term assets, poor balance of business capital, and high pressure to pay short-term loans. Investment development strategy is not reasonable, high debt ratio, and low liquidity. Thereby, it requires the Group to make the right short-term and long-term strategic decisions to solve the remaining limitations, bring the company out of the “squad” and achieve high efficiency in business activities.

Faced with these situations, the author proposes a number of crucial solutions to improve the financial situation, prevent and limit the bankruptcy risk of enterprises, such as:

For starters, Build a suitable financial structure for business activities. Hoang Anh Gia Lai Group needs to continue to be transparent in financial activities, production and business activities. Besides, the company needs to build a reputation to develop good long-term relationships with the domestic investor community and especially international investors to be able to successfully mobilize capital for production and business needs. Along with that, enterprises need to ensure a reasonable amount of capital and capital structure for the Group’s development in the present and future period.

Secondly, Strengthening cost control, and investing in the innovation of fixed assets go hand in hand with improving the efficiency of using fixed assets. Enterprises need to plan and implement the management and use of fixed assets well. Besides, conducting regular inspection and classification of fixed assets to improve management efficiency. Enterprises should also focus on investing in new fixed assets in line with the advancement of science and technology.

Thirdly, Enhance the capacity to analyze the Altman Z-score model. If the company’s business plans are calculated and verified by the Z-score model, we can predict how the company’s financial capacity will change so that we can decide whether to adjust or continue to implement that business plan. To do this requires a team of financial analysts to have a higher level of expertise, even a combined finance department that uses the Z-score model in analysis separately from the accounting department.

Additionally, Raising awareness of businesses about assessing the financial capacity of the company, especially the risk of bankruptcy, reform must be from the leadership. Currently, the issue of financial management, assessing the company’s capacity as well as the risk of bankruptcy, is known to businesses. Managers need to realize that the implementation team applying the Z-score model is very necessary, so investing in training, as well as fostering to improve professional skills in accounting and the application of the model. model, or recruiting new personnel with expertise and understanding of financial analysis is essential to meet the requirements of accounting work and application of the model.

Finally, Proper use of financial leverage. The ratio of Total liabilities on Total assets is an indicator representing the group of financial leverage and this indicator has a positive relationship with the risk of bankruptcy, that is when this coefficient increases, the risk of bankruptcy will also increase and vice versa. With Hoang Anh Gia Lai, the more debt the company has, the more likely it is to be insolvent, too much debt will lead to a higher risk of bankruptcy. Therefore, to prevent and limit the risk of bankruptcy, enterprises need to consider using financial leverage appropriately, thereby limiting the risk of bankruptcy, better stability, and growth.

## **7. CONCLUSION**

The article has summarized the content of Altman Z-score model, applied the Z-score model to analyze and assess the bankruptcy risk of Hoang Anh Gia Lai Group in the 06-year period from 2017 -

2022. In addition, the article also points out the achievements of enterprises in the past period, and points out the remaining limitations and causes of those limitations. Thereby, the authors propose some solutions to effectively apply the Altman Z-score model to help improve the financial situation, prevent and limit the bankruptcy risk of enterprises in the future. This will be an effective tool to help the Group avoid financial risks, especially the bankruptcy risk of enterprises, thereby avoiding consequences for society, especially “non-performing loan”.

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## THE IMPACT OF WORKING CAPITAL MANAGEMENT ON THE PROFITABILITY OF MANUFACTURING COMPANIES LISTED ON THE VIETNAM STOCK EXCHANGE

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*ABSTRACT: The purpose of this research is to examine the impact of working capital management on the profitability through a sample of 755 Vietnamese manufacturing companies listed on the Vietnam stock exchange from the years 2016 to 2020. Based on the findings presented in this research, empirical support for the proposed model of factors affecting the firm's profitability has been found. Propensity Score Matching (PSM) is also used to impact of working capital management on the profitability in order to ensure that these industries are randomly chosen. The paper indicates that the firm profitability is significantly influenced by working capital management, leverage, liquidity and growth of sales revenue. In which, the account receivable management which is one of the contents of working capital management, can be used as a channel to decrease the negative impact of COVID-19.*

*Keywords: Working capital management, profitability, manufacturing companies, Propensity score matching, COVID-19.*

### 1. INTRODUCTION

Inadequate capacity for financial management can be considered as a vivid explanation for the low efficiency of Vietnamese corporations in comparison with foreign ones upon international integration. Long-term capital and working capital management are two core components of financial management. Especially, working capital management can directly and significantly influence the financial situation of the entity. Working capital management is related to the day-to-day operations of the business, which are necessary to maintain the business's production and business processes on a regular and continuous basis. Great working capital management can optimize resources, reduce limiting factors, save costs and increase working capital turnover; thereby, it directly influences the profitability of the company. The desired seeking for the noticeable impacts of working capital management on corporate profitability is one of the most indispensable contributors to the sustainable development of any business. Therefore, enterprises need to be very careful and attentive in managing working capital. In fact, manufacturing enterprises have been struggling with optimizing the level of receivables, payables, and inventories, which affects their profitability. Specifically, businesses with low receivables turnover and low inventory turnover, and thereby their payables turnover is high; have been having difficulty with recovering capital. The above factors affect the number of days of cash flow in the business, affecting its liquidity and profitability.

Up to now, there have been many scientific studies about the influence of working capital management on the profitability of enterprises. Summarizing those studies, the authors point out the research gap in the topic. In the context of the economy being severely affected by the COVID-19 pandemic, domestic enterprises and especially manufacturing enterprises are struggling to find ways to overcome difficulties that reduce the efficiency of working capital management and profitability of the firm. Recognizing that urgency, the authors have chosen the topic "The impact of working capital management on the profitability

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of manufacturing companies listed on the Vietnam Stock Exchange”. Based on the provided data about manufacturing enterprises listed on the Vietnamese stock exchanges, the researchers thoroughly analyze how a well-organized system of utilizing working capital can benefit the profitability of those companies over the last few years. In the background of findings, some recommendations are proposed to improve the domestic corporations’ working capital management capacity, which in turn significantly enhances their profitability. Moreover, the research contributes evidence for future experimental studies. Since the impact of the pandemic on the profitability of firms is empirical, the authors used the Propensity Score Matching (PSM) method to ensure that the treatment group and control group were distributed randomly.

## **2. THEORETICAL FRAMEWORK:**

### **2.1. Theory framework:**

#### **2.1.1. Overview of working capital management in enterprises:**

##### **a. Working capital management**

Working capital is the total amount of payment in advance used for a business’s investment, making up current assets for the firm’s operations. In other words, working capital represents the value of current assets (Bùi Văn Vân, Vũ Văn Ninh, 2013). This concept is used in measuring economic scale based on the gross concept.

According to the net concept, the term “working capital” mentions current assets consisting of cash, accounts receivables, inventories, and other short-term loans like supplier payables. Net working capital is calculated by subtracting current liabilities from current assets (Ross et al., 2013). Ross believed that businesses need net working capital while financial managers stated net working capital is simply the working capital of a business in some cases. This concept is made use of evaluating liquidity.

##### **b. Content of working capital management**

###### ***Inventory management***

A business’s inventory is part of its assets that needs to be kept in order to ensure its normal business operations. A business’s inventory includes raw materials in the production reserve stage; unfinished products; semi-finished products in the production stage; and goods in the consumption stage. Stocking inventory helps companies ensure the change in consumption demand while also providing raw materials. However, not all types of inventories can be easily converted to cash.

###### ***Account receivable management***

Receivables refers to the total value of goods that the corporation has already delivered to customers but has not yet received relevant payment. Receivables come into view once the company implements credit policies with the aim of increasing sales volume and reducing inventories. Executing credit sales, however, entails numerous risks and surging costs, such as the cost of receivables management, debt collection cost, and the opportunity cost of capital. Furthermore, the circumstances of customers’ unpunctuality in returning debts can give voice to the previously hidden risk of initiative deficiency in fully recovering the company’s receivables and hinder its efficiency.

###### ***Account payable management***

Accounts payables are comprised of trade payables, prepayments from customers, and cyclical debts such as salaries, taxes, and other payables. The aforementioned payables arise when an enterprise purchases inputs but has yet to make the relevant payment or when it sells products and goods previously paid for in advance. The emergence of payables helps businesses temporarily delay disbursing money, thereby benefiting enterprises by reducing a part of their working capital needs.

### ***Cash management***

Cash management, which is part of the wider task of treasury management, is concerned with optimizing the amount of cash available, maximizing the interest earned by spare funds not required immediately and reducing losses caused by delays in the transmission of funds. Holding cash to meet short-term needs incurs an opportunity cost equal to the return which could have been earned if the cash had been invested or put to productive use. However, reducing this opportunity cost by operating with small cash balances will increase the risk of being unable to meet debts as they fall due, so an optimum cash balance should be found.

#### **c. Working capital policies**

The working capital policy is classified into three schools: aggressive, conservative and moderate working capital policies.

**Aggressive Policy:** A policy that maintains a low level of cash, inventory, and terms of trade credit crunch corresponding with their turnover. A low amount of cash and inventory means less cash backlog in working capital, which helps businesses increase profitability and efficiency. However, this policy can also cause risks due to a shortage of cash and inventory for the firm's operations.

**Conservative policy:** A policy that maintains a large amount of cash, inventory, and generous credit terms related to a certain level of revenue. This policy results in a large amount of capital and helps reduce the risk of working capital shortage. However, this policy may lead to a decrease in the business's profitability and efficiency.

The moderate policy places itself between an aggressive policy and a conservative one, assuming both characteristics. No policies are the best for the business because no policies are perfect. Enterprises need to develop and decide which policies are suitable for each period.

It should be noted that the working capital policies of a company can be characterized as aggressive, moderate or conservative only by comparing them with the working capital policies of similar companies. There are no absolute benchmarks of what may be regarded as aggressive or otherwise, but these characteristics are useful for analyzing the ways in which individual companies approach the operational problem of working capital management.

#### **2.1.2. Determinants of working capital management:**

##### **a. Financial Leverage**

Financial leverage reflects the proportion of debt used in the total capital of a business. Many businesses choose debt capital to make up for the shortfall because this is an external source of capital with a relatively low cost of capital. Financial leverage is considered as a legal "tax shield" of businesses. Moreover, financial leverage is properly understood as "leverage that helps businesses grow faster and better through increasing return on equity (ROE) and earnings per share (EPS). Some previous studies have shown a positive relationship between financial leverage and corporate profitability (Singapurwoko, 2011). On the contrary, if the economy is unstable and businesses do not perform well, businesses using debt will suffer heavier losses than the one not using debt. Murugesu's study (2013) on companies listed on Columbo Stock Exchange showed a negative relationship between financial leverage and profitability of the business. Some other studies also reached similar conclusions such as Hall & Weiss (1967); Baker (1973); Hurdle (1974).

##### **b. Growth potential**

The growth rate of the business can be represented as growth of revenue or capital. Theoretically, businesses with high capital growth or revenue growth are likely to have high operating efficiency. To



be specific, the growth rate has a positive impact on the business profitability (Cho & Pucik, 2005; Yang, 1996). However, other studies indicate that when enterprises expand the production scale, their expenses will increase corresponding to the increased income. If the increase in costs exceeds the revenue growth, profitability will be negatively affected. This explains the negative relationship between growth rate and profitability in the research carried out by Jasra (2011) and Bashir et al. (2013).

### **c. Liquidity**

Liquidity can be measured by the current ratio, which is calculated by dividing current assets by current liabilities, indicating the speed at which a business can react to unexpected changes in the economy. Therefore, enterprises holding major liquid assets might reduce the risk of late payment. Deloof (2003) has proven the important role of liquidity (working capital) management for improving business's profitability. Businesses with good liquidity are also considered safe investment options for investors. Consequently, businesses can easily raise capital and get business opportunities with high profitability. However, if a business holds too many short-term assets, it may miss out on long-term investment opportunities.

### **d. COVID-19 pandemic**

The COVID-19 pandemic has negatively affected the supply, production and distribution of manufacturing enterprises, causing them to bear unprecedented heavy losses. When social distancing policies were issued, it was impossible for people to go out to work or to entertain. As a result, the consumption of common goods in some industries decreased significantly, businesses could not sell goods, and stagnant capital due to excess inventories made it difficult for enterprises to reproduce. Meanwhile, businesses in the food and pharmaceutical industries have been less affected by the COVID-19 pandemic. The reason is that these industries provide necessities for human survivors. Since the impact of the pandemic on the profitability of firms is empirical, the authors used the Propensity Score Matching (PSM) method to ensure that the treatment group and control group were evenly distributed randomly.

## **2.2. Recent researches of the working capital management on the profitability:**

Firstly, working capital turnover time is negatively related to operating efficiency. In other words, the longer the working capital turnover period, the more stagnant working capital in all stages of the business process often leads to a decrease in business profitability. This point of view is supported by Aggressive Policy of WCM. The policies stated that company maintains a low level of cash, inventory, and terms of trade credit crunch corresponding with their turnover. A low amount of cash and inventory means less cash backlog in working capital, which helps businesses increase profitability and efficiency. This conclusion is supported by studies that have been generalized in research reviews such as Deloof's study (2003); Research by Lazaridis and Tryfonidis (2006); Research by Raheman and Nasr (2007).

Secondly, working capital turnover time is positively related to operating efficiency. The viewpoint is consistent with Conservative policy. That policy maintains a large amount of cash, inventory, and generous credit terms related to a certain level of revenue. This policy results in a large amount of capital and helps reduce the risk of working capital shortage. However, this policy may lead to a decrease in the business's profitability and efficiency. This conclusion is supported by Sharma and Kumar (2010), Abuzayed (2012), Charitou et al., (2010), Mathuva (2010)...

In summary, working capital management has a direct impact on the business profitability of enterprises. However, the direction and level of impact depend on many factors as well as on enterprises under certain conditions. Therefore, studying the relationship between working capital management and the business profitability of enterprises in specific industries will contribute more evidence as well as help enterprises to improve their business operation.

2.3. Building the research model:

Table 3.1: Variable Measurements

The Dependent variable			
<b>Return on Assets (ROA)</b>	<b>= Net income / Total assets</b>	<b>The return on assets</b>	
Gross Operating Profit (GOP)	= (Sales – Cost of goods sold) / (Total assets – Financial Assets)	The ratio of operating income plus depreciation and amortization to total assets minus financial assets	
The Explanatory variables			
<b>Determinants</b>	<b>Observed variables</b>	<b>Measurement</b>	<b>Expected relation</b>
ADI	Average days in inventory	= Inventories / (Cost of Goods Sold / 365)	Negative
ADR	Average days in receivables	= Account Receivables / (Net Sales / 365)	Negative
ADP	Average days in payables	= Account Payables / (Cost of Goods Sold / 365)	Positive
The Control Variables			
<b>Determinants</b>	<b>Observed variables</b>	<b>Measurement</b>	<b>Expected relation</b>
CR	Current ratio	= Current Assets / Current Liabilities	Negative
DEBT	Leverage	= Total Debt / Total Assets	Negative
GROWTH	Sale growth	= Sales <sub>1</sub> – Sales <sub>0</sub> / Sales <sub>0</sub>	Positive
The Dummy Variable			
<b>Determinants</b>	<b>Observed variables</b>	<b>Measurement</b>	<b>Expected relation</b>
COVID	Covid -19	From 2020	Negative
The Interactive Variable			
<b>Determinants</b>	<b>Observed variables</b>	<b>Measurement</b>	<b>Expected relation</b>
ADR*COVID	Average days in receivables in case of COVID-19	From 2020	Negative

Source: Compiled by the author

Based on economic theories and previous studies, the authors have constructed a research model to investigate the impact of working capital management on the profitability. The authors also added an external factor, which is the COVID-19 pandemic. Thereby, it can both provide a general and in-depth view of the impact of working capital management and expand the research. Economic theories and many previous empirical studies have shown that, if the enterprise pursues an aggressive working capital management policy, the indicator reflects working capital management (cash conversion period, number of days inventory, number of days account receivables) has a negative relationship with the profitability of the company, and number of days account payables has a positive relationship with business profitability. If the enterprise pursues a conservative working capital management policy, cash conversion period, number of days inventory, and number of days account receivables have a positive relationship with business profitability, while the number of days account payables has a negative relationship with business profitability. Because it is not known which working capital management policy is being pursued by manufacturing enterprises, in this study it is expected that there is a relationship between working capital management and the business profitability of enterprises. Therefore, based on the theory and previous studies, the hypothesis of the research model is given as follows:

**Hypothesis 1:** The working capital management has significant impact on firm profitability.

**Hypothesis 2:** The COVID-19 pandemic is strongly related to the extent to which working capital management affects firm profitability.

The models focus on examining the impact of working capital management on the profitability, in which, dependent variables representing the business profitability of the enterprise include: ROA - Return on Assets and GOP - Gross Operating Profit. The representative variables for working capital management include: ADI - the average number of days inventory, ADR - the average number of days receivable, and ADP - the average number of days payable. The control variables included DEBT representing for capital financing policy, CURRENT RATIO representing for liquidity, and GROWTH representing for revenue growth rate of the company. Besides, models containing the COVID dummy variable are added to examine how the impact of working capital management on the profitability is affected during the COVID-19 pandemic compared to normal situations.

The authors used the following *model to research the impact of WCM on profitability in the absence of the COVID-19 epidemic*:

**Model 1:**  $ROA_{it} = \beta_0 + \beta_1 ADR_{it} + \beta_2 ADI_{it} + \beta_3 ADP_{it} + \beta_4 DEBT_{it} + \beta_5 CR_{it} + \beta_6 GROWTH + \beta_7 YEAR + \epsilon_{it}$

**Model 2:**  $GOP_{it} = \beta_0 + \beta_1 ADR_{it} + \beta_2 ADI_{it} + \beta_3 ADP_{it} + \beta_4 DEBT_{it} + \beta_5 CR_{it} + \beta_6 GROWTH + \beta_7 YEAR + \epsilon_{it}$

In which,  $i$  represents the  $i$ th company ( $i = 1 \dots 755$ ) and  $t$  represents the  $t$  year ( $t = 1 \dots 5$ )

The authors used the following *model to research the impact of WCM on profitability under COVID-19 pandemic conditions*:

**Model 3:**  $ROA_{it} = \beta_0 + \beta_1 ADR_{it} + \beta_2 COVID + \beta_3 ADR * COVID + \beta_4 ADI_{it} + \beta_5 ADP_{it} + \beta_6 DEBT_{it} + \beta_7 CR_{it} + \beta_8 GROWTH + \epsilon_{it}$

**Model 4:**  $GOP_{it} = \beta_0 + \beta_1 ADR_{it} + \beta_2 COVID + \beta_3 ADR * COVID + \beta_4 ADI_{it} + \beta_5 ADP_{it} + \beta_6 DEBT_{it} + \beta_7 CR_{it} + \beta_8 GROWTH + \epsilon_{it}$

In which,  $i$  represents the  $i$ th company ( $i = 1 \dots 755$ ) and  $t$  represents the  $t$  year ( $t = 1 \dots 5$ )

This study applies the PSM in order to investigate the impact of working capital management on the profitability of the two groups, which are companies affected by COVID-19 and companies unaffected by COVID-19 in Vietnam during 2016-2020. Applying PSM will ensure the random selection of subjects and random allocation of the treatment to subjects. In other words, the treated and control (untreated) groups are randomly allocated.

The authors classified into two categories based on the sample's businesses' industries. Construction materials, personal products, home goods, retail, transportation, logistics, and other businesses are considered to be among those most significantly impacted by COVID-19. Pharmaceuticals, food are unlikely to be significantly impacted by COVID-19. Next, the authors match, without replacement (within each year and industry), firms being affected by COVID-19 (treated = 1, if the company is a member of the covid-19-affected industries) with their counterpart being unaffected by COVID-19 (treated = 0, if the company is included in the covid-19-unaffected industries) which has the closest predicted probability within a maximum caliper distance of 0.1. The sample obtained after running the model by PSM method includes 1340 observations, of which 670 are treated and 670 are matched. Baseline models are repeated on the matched sample to test the model's hypothesis.

### 3. RESEARCH METHOD:

#### 3.1. Data collection:

The data sample was formed by 755 manufacturing companies listed on the Hanoi Stock exchange (HNX) and the Ho Chi Minh Stock exchange (HOSE) over the period of 10 years (from 2010 to 2019) which was gathered mostly from company financial statements, corporate associate announcements, reports, and yearbooks from the Stock Exchange and FinnPro Exchange platform. Financial institutions, banking, insurance, renting and real-estate companies were excluded from the sample because of their specific nature of services. In addition, non-missing observations are also required. The authors winsorise all variables at the 1 and 99 percentages to reduce the impact of outliers. Our final sample consists of an unbalanced panel of 3775 firm-year observations.

#### 3.2. Data analysis:

The authors use a package of STATA software version 17 to estimate the regression equations that we proposed above. First off, bivariate relations among variables were explored via examining correlation. Next, we used the Fixed effects model (FEM) to examine the effect of debt ratio on performance. The research also examined some necessary detector regressive assumptions to ensure the result of regression is blue such as autocorrelation and multicollinearity before the conclusion.

### 4. RESULTS AND DISCUSSION:

#### 4.1. Several necessary tests for the model:

##### 4.1.1. Descriptive summary:

**Table 2: Descriptive summary**

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max	(6) p1	(7) p25	(8) p50	(9) p75	(10) p99
ADP_w	3,775	60.80	100.4	0	749.6	0	15.03	35.06	66.37	749.6
ADI_w	3,775	164.7	447.8	0	3,443	0	10.79	56.48	122.2	3,443
ADR_w	3,775	192.6	447.3	0	3,548	0	31.37	77.25	174.3	3,548
COVID	3,775	0.200	0.400	0	1	0	0	0	0	1
ADR*COVID	3,775	46.23	249.6	0	3,548	0	0	0	0	915.9
ROA1	3,775	5.619	6.836	-11.91	32.94	-11.91	1.156	4.178	8.314	32.94
GOP1	3,775	24.35	26.62	-3.506	137.9	-3.506	5.865	15.68	34.55	137.9
DEBT1	3,775	46.30	25.11	0	94.13	0	27.14	48.06	66.20	94.13
CR1	3,775	258.6	402.1	0	2,931	0	106.8	142.5	238.4	2,931
Growth1	3,775	16.95	74.86	-79.02	552.0	-79.02	-8.255	3.001	19.79	552.0

*Source: Calculation and synthesis of the author team from Stata software.*

Table 2 reports the descriptive statistics of the main studied variables, which are based on the financial data from 2016 to 2020. After logarithmic calculation, the average value of gross operating profit (GOP) is 24.35 percent. Enterprises reach this lowest target of -3.506 and the highest is 137.9. The mean of ROA (Return on Assets) is 5.61 percent, and the standard deviation of ROA is 6.83, with a maximum value of 32.94 percent and a minimum value of -11.91 percent. The average value of ADR (number of days account receivables), ADI (number of days inventory) and ADP (number of days account payables) is 192 days, 164 days, and 60 days, respectively. In addition, these enterprises have an average rate of debt ratio of 46.30 percent. The current ratio shows a large standard deviation of 402.1. The average operating income growth rate is 16.95 and fluctuates in the range of (-79.02; 552.0).

### 4.1.2. Correlation matrix

**Table 3: Correlation matrix**

	ROA1	GOP1	DEBT1	CURRENT RATIO1	Growth1	ADP_w	ADI_w	ADR_w	COVID	ADR *COVID
ROA1	1									
GOP1	0.547***	1								
DEBT1	-0.247***	-0.0854***	1							
CURRENT RATIO1	0.129***	-0.0498**	-0.461***	1						
Growth1	0.133***	0.00316	0.0271	0.0161	1					
ADP_w	-0.193***	-0.178***	0.187***	-0.0803***	-0.0572***	1				
ADI_w	-0.0992**	-0.170***	0.0956***	0.000365	-0.0303	0.494***	1			
ADR_w	-0.227***	-0.239***	-0.0341*	0.113**	-0.0402*	0.515***	0.458***	1		
COVID	-0.0777***	-0.0533**	-0.00757	-0.0194	-0.0694***	0.0391*	0.0136	0.0431**	1	
ADR*COVID	-0.132***	-0.117***	-0.00243	0.00957	-0.0113	0.260***	0.217***	0.497***	0.370***	1

Source: Calculation and synthesis of the author team from Stata software.

The table above shows us the correlation between the variables used in the research model. We can see that most of the variables are relatively closely correlated with each other.

### 4.1.3. Hausman test

The authors use the Hausman test to choose between FEM and REM regression models for panel data of the research sample. The difference between these two estimation models depends on the difference in the assumptions made when building these two models. With the FEM model, it is assumed that the independent variables and the error are correlated, while the REM model assumes that there is no correlation between the independent variables and the error (Greene, 2007). In the Hausman test, the hypothesis is tested as follows:

Hypothesis H0: There is no difference between using FEM and REM.

Hypothesis H1: There is a difference between using FEM and REM.

If H0 is rejected, then using REM is not reasonable and it is necessary to use the FEM model to estimate.

The authors conduct the Hausman test for all 4 models on the data of the research sample with STATA software, the P values of models 2, 3, and 4 are all greater than 0.05, thereby accepting the hypothesis H0, using the REM model to estimate. The P value of model 1 is less than 0.05, so, at the 5% level of significance, the null hypothesis H0 is rejected; Hausman test results indicate that the FEM model will be better than the REM model. The table of test results is as follows:

**Table 4. Results of the Hausman test**

Model	The p-value	Chosen model
1	0%	FEM
2	18.98%	REM
3	64.73%	REM
4	99.92%	REM

Source: Calculation and synthesis of the author team from Stata software

**4.1.4. Test of Heteroskedasticity:**

In order to verify Heteroskedasticity in the research model, perform the Modified Wald test with model 1 and Breusch and Pagan Lagrangian with models 2, 3, and 4 as these following hypothesis:

Hypothesis H0: Homoskedastic

Hypothesis H1: Heteroskedasticity

If the P - value < 0.05, then reject the H0 hypothesis and accept the H1 hypothesis, there is a Heteroskedasticity in the model. From the data information, the results of the P-values of all models are > 0.05, which proves that hypothesis H0 is accepted, or in other words, the models do not have Heteroskedasticity. The test results are as follows:

**Table 5: Results of the Heteroskedasticity test**

Model	The p-value	Results
1	Prob > chi2 = 0.5107	Hypothesis H0 is accepted
2	Prob > chi2 = 0.1898	Hypothesis H0 is accepted
3	Prob > chibar2 = 1.0000	Hypothesis H0 is accepted
4	Prob > chibar2 = 1.0000	Hypothesis H0 is accepted

*Source: Calculation and synthesis of the author team*

**4.1.5. Test of Autocorrelation**

In order to verify the Autocorrelation of the model, the authors perform the Wooldridge test with 4 models as the following hypothesis:

Hypothesis H0: There is no Autocorrelation.

Hypothesis H1: There is an Autocorrelation.

If the p-value < 0.05, then reject hypothesis H0 and accept hypothesis H1, there is autocorrelation in the model. From the results and data information, the P-values of all models are greater than 5%, which means that the models do not have autocorrelation. The test results are as follows:

**Table 6: Results of the Autocorrelation test**

Model	The p-value	Results
1	Prob > F = 0.0513	Hypothesis H0 is accepted
2	Prob > F = 0.0913	Hypothesis H0 is accepted
3	Prob > F = 0.0513	Hypothesis H0 is accepted
4	Prob > F = 0.0850	Hypothesis H0 is accepted

*Source: Calculation and synthesis of the author team*

**4.2. Findings and discussion:**

**Table 7: Regression results of the impacts of variables on ROA and GOP under normal conditions**

	Model 1	Model 2
VARIABLES	ROA_w	GOP_w
ADR_w	-0.00139***	-0.00124*
	(-4.907)	(-1.770)
ADI_w	0.000539	0.000958

	(1.592)	(1.142)
ADP_w	0.00192	-0.00635*
	(1.307)	(-1.750)
DEBT_w	-0.0318***	0.0732***
	(-4.418)	(4.107)
CURRENTRATIO_w	0.00131***	0.00244***
	(4.024)	(3.034)
Growth_w	0.0123***	0.0216***
	(12.05)	(8.542)
Constant	0.0671***	0.155***
	(3.668)	(3.415)
Observations	3,775	3,775
Adjusted R-squared	0.664	0.864
Number of IDs	755	755

Source: Analyzed by the authors using STATA

(Note: This table reports the regression results of impacting factors on corporate profitability, using FEM and REM models in STATA. The dependent variables include ROA and GOP. Column (1) shows the names of the independent variables. Column (2) shows the fixed effect and column (3) shows the random effect of profitability. Significance levels of 10%, 5%, and 1% are denoted by \*\*\*, \*\*, and \* respectively.)

First, the regression result in Table 2.9 shows the negative relationship between the average number of days receivable (ADR) and ROA at a significance level of 1%, and GOP at a significance level of 10%. The results are also consistent with the expected signs of this variable's coefficient and the previous studies. They also show that the impact of ADR on ROA is stronger than its effect on GOP. Specifically, if ADR decreases by 100 days, ROA will increase by 0.139%, which is a significant increase compared to the mean ROA of 5.619% (table 2.3). Therefore, the recommendation for manufacturing companies listed in Vietnam is that the shorter the collection period, the higher the business profitability. Besides, the regression results show that the number of average days payables (ADP) and the number of average days inventory (ADI) have almost no significant impact on the two dependent variables, which are ROA and GOP. However, since the ADR has significant impacts on profitability, **Hypothesis 1:** "The working capital management has significant impact on firm profitability" is approved.

Second, the regression result also shows that the debt ratio has a negative relationship with ROA at a significance level of 1%, and has a positive correlation with GOP at a significance level of 1%, which is consistent with the expected signs. In terms of ROA, the effect of DEBT is -0.0318. This means, if the firm reduces its debt ratio by 10%, its ROA will increase by 0.318%. ROA is returns on assets, which is calculated by dividing a company's net income by its total assets. The higher debt ratio, the less net income of the company is; thereby the relation of debt ratio and ROA is negative. This result is consistent with the study of Margaritis, D., & Psillaki, M. (2010). In terms of GOP, the effect of DEBT is 0.0732. This means, if the firm increases its debt ratio by 10%, the GOP will increase by 0.732%. GOP is the ratio of operating income plus depreciation and amortization to total assets minus financial assets. GOP does not minus the financial costs (including financial interest), so that the higher the debt ratio, the higher operating income. Therefore, debt ratio has positive relation with GOP. The above results are consistent with economic theories and previous studies.

Third, the regression result in Table 2.9 shows a positive relationship between the current ratio (CR) and ROA and GOP at a significance level of 1%, which is consistent with the expected sign of this variable’s coefficient. The influence of the Current ratio on ROA and GOP is 0.0013 and 0.0024, respectively. If the enterprise invests a large amount of capital in short-term assets, maintains a high cash balance, has a generous credit policy, and maintains a large inventory, this shows that the business is using a loose investment policy, focusing on the ability to ensure the payment of short-term debts, avoiding shortages of raw materials, goods, and cash in daily operations. This investment policy always ensures a certain level of safe working capital (e.g. safe level of inventory, cash, etc.) for businesses, limiting business risks, however, businesses have to trade off by incurring high costs and stagnant capital. This policy has a negative impact on profitability, thereby reducing operational efficiency. In contrast, the business applying the risky investment policy, which is to maintain a smaller amount of working capital, can improve the efficiency of working capital management, increasing profitability. However, they have to face a higher level of risk. Theoretically, working capital investment policy has an impact on working capital efficiency, profitability, and operating efficiency.

Fourth, table 2.9 also shows the positive effect of the growth rate of net revenue reflected on ROA and GOP at a significance level of 1%, which is consistent with the expected sign of this variable’s coefficient. In terms of ROA, the influence of the Growth variable is 0.0123, that is, if the business grows revenue by 10%, ROA will increase by 0.123%. About GOP, the influence of the Growth variable is 0.0216, meaning, if the business grows revenue by 10%, the GOP will increase by 0.216%. These are all impressive numbers and are also consistent with the popular view among international economists and financial researchers that the growth rate of net sales is one of the main factors affecting the profitability of enterprises.

**Table 8: Regression results of the impacts of variables on ROA and GOP under the COVID pandemic**

	<b>Model 3</b>	<b>Model 4</b>
VARIABLES	ROA_w	GOP_w
ADR_w	-0.00115*** (-3.639)	-0.00144* (-1.842)
COVID	-0.0106*** (-4.831)	-0.0368*** (-6.810)
ADR*COVID	-0.000631* (-1.769)	0.000505 (0.572)
ADI_w	0.000528 (1.558)	0.000967 (1.153)
ADP_w	0.00191 (1.304)	-0.00634* (-1.748)
DEBT_w	-0.0317*** (-4.404)	0.0731*** (4.101)
CURRENTRATIO_w	0.00128*** (3.927)	0.00246*** (3.059)
Growth_w	0.0125*** (12.18)	0.0214*** (8.425)



Constant	0.0667***	0.155***
	(3.647)	(3.421)
Observations	3,775	3,775
Adjusted R-squared	0.664	0.864
Number of IDs	755	755

Source: Analyzed by the authors using STATA

(Note: This table reports the regression results of impacting factors on corporate profitability, using FEM models in STATA. The dependent variables include ROA and GOP. Column (1) shows the names of the independent variables, dummy and interaction variables. Column (2) and column (3) show the fixed effect of profitability. Significance levels of 10%, 5%, and 1% are denoted by \*\*\*, \*\*, and \* respectively.)

As previously mentioned, in the working capital management factors, only the ADR variable has practical economic significance and has a reasonable impact on ROA and GOP, which has been analyzed and proven through **Hypothesis 1** and the conclusion that this hypothesis is valid and accepted. Therefore, in order to thoroughly analyze the influence of external factors, specifically the global pandemic of COVID-19, as well as the impact of ADR in the case of COVID-19 on the profitability of manufacturing enterprises listed in Vietnam, the authors added the dummy variable COVID and the interaction variable ADR\*COVID into the research model and continued the regression analysis. The model regression results depicted in Table 2.10 show the following specific effects:

*Firstly*, the regression results continue to show the negative relationship between ADR and ROA and GOP at the statistical significance levels of 1% and 10%, respectively. This goes on to express that if businesses tighten their trade discount policies and limit customers' appropriation of capital, they can increase their profitability. The effect of ADR on ROA, in this case, is reduced to -0.00115, which means that if the business reduces the receivables turnover period to 100 days, it can increase ROA by 0.115%. On the other hand, the impact of ADR on GOP increases to -0.00144, which means that if a business reduces ADR by 100 days, it can increase GOP by 0.144%. Since there is ADR in WCM exerting significant influence on firm profitability, **Hypothesis 1** continues to be accepted in this model.

*Secondly*, unlike the independent variables, the control variables have more significant impacts on ROA and GOP. These impacts show almost no changes in comparison with the previous model analyzed under normal conditions. As can be seen, DEBT has a negative correlation with ROA and a positive correlation with GOP. CURRENT RATIO and Growth have the same effect on both ROA and GOP. At the same time, the impact of these variables on firm profitability is considerable and consistent with economic theory as previously analyzed. Since then, we have other brilliant evidence that the key corporate policies, including financing policy and capital investment policy, as well as revenue growth rate, have a significant influence on the firm's profitability.

*Thirdly*, the dummy variable COVID has a huge negative impact on business profitability. This result of the coefficient's sign is consistent with the expected sign. If the COVID-19 pandemic did not happen, the impact of ADR on ROA and GOP would be the aforementioned numbers. On the contrary, just the outbreak of the COVID-19 pandemic has already caused a significant decrease in ROA and GOP of 1.06% and 3.68%, respectively. In this case, as the interactive variable ADR\*COVID indicates the impact of ADR on ROA increases to -0.000631, which means that if businesses can manage and reduce ADR, they can partly overcome the severe consequences of COVID-19. In other words, since COVID amplifies the impact of ADR on ROA,

ADR becomes a useful channel for businesses to mitigate the consequences of the COVID pandemic on their profitability by restricting their trade credit policy. In contrast, the effect of ADR on GOP, in this case, has a value of 0.000505, showing a positive relationship with GOP. However, both the results of ADR\*COVID are negligible and can be ignored. Thus, we have had a basis to admit **Hypothesis 2**: “The COVID-19 pandemic is strongly related to the extent to which working capital management affects firm profitability”.

**Table 9: Regression results of the impacts of variables on ROA and GOP under the COVID pandemic using PSM procedure**

VARIABLES	ROA	ROA	GOP	GOP
COVID1		-0.0132***		-0.0353*
		(-2.799)		(-1.917)
ADRC19		0.00331**		0.0119*
		(2.572)		(1.749)
ADR	-0.0106***	-0.0117***	-0.0379***	-0.0419***
	(-8.790)	(-8.015)	(-6.239)	(-5.486)
ADI	0.000794	0.000834	-0.0238**	-0.0236**
	(0.347)	(0.364)	(-2.113)	(-2.015)
ADP	-0.000927	-0.000687	0.003	0.00386
	(-0.323)	(-0.259)	(0.197)	(0.252)
DEBT	-0.0618***	-0.0615***	0.0813	0.0823
	(-3.532)	(-3.522)	(1.026)	(1.040)
CR	0.00277	0.00283	-0.0104**	-0.0102*
	(1.543)	(1.576)	(-2.002)	(-1.961)
GROWTH	0.0135***	0.0133***	-0.0233	-0.0241
	(2.647)	(2.610)	(-1.498)	(-1.583)
2020o.year		-		-
Constant	0.101***	0.102***	0.410***	0.414***
	(9.351)	(9.449)	(8.887)	(8.917)
Observations	1,340	1,340	1,340	1,340
Adjusted R-squared	0.166	0.168	0.125	0.126

Robust t-statistics in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Analyzed by the authors using STATA

(Note: This table reports the regression results of impacting factors on corporate profitability, using the PSM method and FEM models in STATA. The dependent variables include ROA and GOP. Column (1) shows the names of the independent variables, dummy and interaction variables. Column (2) and column (3) show the fixed effect of profitability. Significance levels of 10%, 5%, and 1% are denoted by \*\*\*, \*\*, and \* respectively.)

After running the new model based on the PSM method with a fixed effect for the year and standard errors clustered at the firm level, the authors found that some indicators underwent significant changes.

First, in terms of working capital management factors, ADI and ADP did not have too many noticeable fluctuations after matching for comparison. In fact, the sign of the impact of these two variables has

changed somewhat, but their impact on the profitability of the business is generally still too small to be evaluated. Meanwhile, the ADR variable after matching the control has a huge change. The impact of ADR on ROA increased from -0.00115 to -0.0117. That means, for businesses negatively affected by the COVID-19 pandemic, when they reduce their ADR by 100 days, they can increase their ROA by up to 1.17%. The results can be explained by the fact that the number of days of accounts receivable measures the amount of time from the time of selling goods and services to collecting money from a customer. The more costs will be receivable longer, such as cost of receivables management, debt recovery, and bad debts. Conversely, if a business can collect accounts receivable from customers on time, it will have more capital to reinvest, thereby increasing sales, minimizing the costs related to debt recovery, and improving profitability. Additionally, the impact of ADR on GOP similarly saw a significant increase from -0.00144 to -0.0419, reflecting that businesses negatively impacted by the COVID-19 pandemic, upon reducing their ADR by 100 days, can increase GOP up to 1.44%. In other words, while a tight trade credit policy can reduce sales, its amazing ability to cut costs can have a great impact on the GOP. To conclude, in the PSM application model, **Hypothesis 1** continues to be accepted.

*Notably*, although COVID still almost kept its direction and impact on the profitability of the business, the regression coefficient of the interaction variable ADR\*COVID changed after being merged for comparison. For businesses impacted by the COVID-19 pandemic, the impact of ADRs on ROA in the event of COVID is no longer amplified. On the contrary, COVID at this time reduced the impact of ADR on ROA by 0.00331%, partly reflecting the loosening of trade credit policy and the fact that increasing ADR can help enterprises increase ROA. However, businesses should note that this reduction effect is very small when compared to the actual impact of ADR on ROA. In general, because the negative impact of ADR on ROA is too large, even if COVID reduces the impact, businesses can still increase ROA when tightening credit, limiting their ADR. Therefore, businesses need to be extremely wise in choosing credit policies at this time. On the other hand, the interaction variable ADR\*COVID still maintains a positive effect on GOP but has a significant increase, from 0.000505 to 0.0119. This means that, for manufacturing businesses affected by the COVID-19 pandemic, the impact of ADRs on their GOP will be significantly reduced, enabling businesses to use a variety of tools and easily make appropriate decisions and policies in unwanted contexts. Therefore, in the PSM application model, **Hypothesis 2** continues to be affirmed.

*As for other factors*, the DEBT variable, which represents capital financing policy, generally impacts corporate profitability the most significantly. In the model with ROA, the regression coefficient of DEBT decreased from -0.0317 to -0.0615, which is almost doubled. This reflects that, for businesses affected by COVID, if they can reduce their debt ratio by 10%, their ROA will increase by 0.615%. To clarify, the higher the debt ratio, the harder it is for businesses to get loans. If these businesses can get a loan, they also have to accept relatively high interest rates. On the contrary, if the business has a low debt ratio, it will be easy to get a loan. However, using high financial leverage also leads to many liquidity risks. Therefore, the results of the negative relationship between debt and profitability are reasonable and consistent with economic theory. On the other hand, in the model with GOP, the regression coefficient of DEBT increases from 0.0731 to 0.0823, reflecting that if a firm increases its debt ratio by 10%, its GOP will increase by 0.823%. This can be explained based on the theory that GOP is calculated by deducting the cost of goods sold from sales; this does not include interest expenses, accumulated depreciation, or taxes. Thus, GOP still contains interest expense; thereby, when enterprises increase debt, interest increases, and GOP also increases.

*In addition*, in terms of liquidity policy, expressed by the variable CURRENT RATIO, after pairing, the impact of CR on ROA has doubled, demonstrating the fact that the current ratio has a significant

impact on the profitability of the enterprise affected by COVID-19. Specifically, the regression results show that, if a business changes its current ratio by 10%, it can change its ROA by 0.0283%. To explain, if the enterprise invests a large amount of capital in short-term assets, maintains a high cash balance, has a generous credit policy, and maintains a large inventory, this shows that the business is using a loose investment policy, focusing on the ability to ensure the payment of short-term debts and avoid shortages of raw materials, goods, and cash in daily operations. This liquidity policy always ensures a certain level of safe working capital for businesses, limiting business risks; however, businesses have to trade off both incurring high costs and profitable capital. This policy has a negative impact on profitability, thereby reducing operational efficiency. In contrast, the business applying the risky investment policy, which is to maintain a smaller amount of working capital, can improve the efficiency of working capital management, increasing profitability. However, they have to face a higher level of risk. On the other hand, we see the impact of the current ratio on the GOP go from 0.00246 down to -0.0102, which is a huge change. Thus, for businesses affected by COVID-19, the current ratio actually has a negative impact on the GOP. Specifically, if a business increases CR by 10%, GOP will decrease by 0.102%. The impact of increasing CR on GOP compared to ROA is completely opposite. Therefore, depending on their goals, businesses need to be extremely smart and careful when choosing appropriate investment policies.

*As for growth rate*, the impact of growth on ROA does not change significantly when increasing from 0.0125 to 0.0133. In other words, businesses impacted by COVID-19 that increase revenue growth by 10% can increase ROA by 0.133%. This is consistent with economic theory and previous studies because revenue is a factor greatly affecting the profitability of enterprises, and businesses always seek to increase revenue to make the biggest profit. However, contrary to popular opinion, for businesses affected by COVID-19, after pairing, we find that growth and GOP have a negative relationship with a significant impact of 0.0241, which means that if businesses increase their revenue growth rate by 10%, GOP will decrease by 0.241%. Possibly, it can be explained that, with the global impact of the COVID-19 pandemic, the difficulty of reducing product costs has increased. If the business continues to increase sales, it may have to trade off with a much larger increase in production costs, leading to the opposite relationship as shown in the results. The effect of increasing growth on GOP compared to ROA is the opposite. Therefore, depending on their goals, businesses need to be wise and careful in deciding whether to increase revenue or not during this difficult epidemic.

## **5. CONCLUSION:**

### **5.1. Limitation**

The study has carried out a relatively thorough and proven analysis, thereby providing a solution to improve the profitability of the enterprise. However, in addition to the achievements, the research topic still has some limitations, specifically:

The problem of information asymmetry between the enterprise and the research paper through the use of financial statements has significant effects. Although the research through the regression method provides a great theoretical foundation, the article has ignored the difficulties and secrets that are only passed on internally within the enterprise. In addition, because the study is based on a very large amount of data and studies on the entire Vietnamese manufacturing industry, thereby ignoring the specific characteristics of each individual manufacturing industry, the study has not shown clear practical aspects of each enterprise in particular.

Additionally, the PSM method requires a control group to compare with the treatment group. The process of selecting a suitable control group can lead to differences between the two groups, which can

distort the study results. The PSM method assumes that all confounding factors are adjusted by building a linear model for the probability of receiving treatment. However, if important confounding factors are not identified and adjusted, the results of the study may not be accurate.

## 5.2. Recommendation

Based on the regression results and literature background, some recommendations are suggested as following:

*Firstly*, it is necessary to take measures to manage account receivables well, shorten the average number of days account receivables.

In terms of internal control system, sale team or finance team should review customer credit line by quarter or by year based on historical payment to consider increase or decrease the credit line in the future. The credit term should be authorised by senior staff before applied to customers. These control procedures make sure that all the sale transactions and trade credit policies can be made to customers with good credit rating. Furthermore, they can reduce the risk of unrecoverable debts and other costs relating to collect receivables.

Instead of focusing on punishing customers in case customers pay late for goods, companies should apply incentive programs for customers to encourage early payments. Enterprises need to focus on developing and implementing preferential policies for customers, such as enjoying a payment discount at an appropriate rate if customers pay early before the due date; or the customer gets faster shipping or free shipping if the customer pays in full and early; or customers enjoy a better credit purchase policy from the business if they maintain full and early payment.

For shortening the average receivable period (ADR), the company can offer an attractive discount for customers who pay early so that customers can enjoy a better commercial discount policy from the business if they maintain early and full payment. But for this measure, businesses also need to consider a reasonable commercial discount because increasing the trade discount means that the business will increase costs and may have negative effects on profits, reducing the operating performance of the business.

*Secondly*, enterprises need to find the optimal capital structure, the appropriate level of debt use, thereby forming the enterprise's debt policy to improve operational performance. According to the theory of financial leverage, when  $BEP > r$ , if a firm increases its debt, it will help amplify its ROE, whereas when  $BEP < r$ , increasing debt will be like a double-edged sword, increasing financial risk, making reduce ROE, reduce the performance of the business. Moreover, businesses should also consider which source to borrow, how long to borrow to suit the nature of their industry, avoid liquidity risks such as due debt but no source to pay, ...

*Thirdly*, for liquidity, businesses need to calculate the optimal level of cash reserves. To determine a reasonable level of cash reserve, the simplest way is to base on the statistics of the average daily cash expenditure and the number of days of reasonable cash reserves. In addition to the above method, the minimum total cost model (Baumol model) can be applied in inventory management to determine the target cash balance of the enterprise.

*Fourthly*, businesses need to carefully consider the relationship between business growth and profitability. Enterprises, when faced with any investment or business opportunity, must adhere to the relationship between costs and benefits received. Enterprises need to focus on measures to boost revenue, increase profits, and improve profitability. Listed manufacturing enterprises need to actively exploit the consumption market and accelerate sales. Enterprises also should actively exploit and build distribution channels, improve business networks, sales methods, prices, payment methods, etc. to promote revenue, thereby increasing profitability.

*Finally*, businesses should improve internal control and management systems to improve the Working capital management and profitability.

Company should apply SAP, MISA, FAST or other software. These software allow updating real data and information appropriately and completely. It can reduce control risks leading to fraud and errors in the information processing, thereby support the managers to make appropriate decision in terms of working capital management. Therefore, it can improve the working capital management and support operational activities in the business.

Enterprises can consider Kaizen as a way to create an conducive environment to enhance the productivity and management. Kaizen - Continuous Improvement supports companies in creating a process-oriented way of thinking and implementing strategies to guarantee continuous enhancements by engaging personnel at all organizational levels. The fundamental concept of the Kaizen strategy is that no day should go by without an advancement being made somewhere inside the company. Kaizen, or continuous improvement, attempts to make every process waste-free by involving every employee in the business. Kaizen encourages individuals to think creatively and implement beneficial changes while consuming fewer resources.

Enterprises also should conduct training and developing programs to improve the competence and knowledge of employees. Based on Learning Curve, employees with high-skilled and experienced competence can help to reduce the production time per unit, thereby enhancing the productivity. That is a way to manage working capital better and improve profitability of the company.

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## IMPACT OF TAX POLICIES ON SMALL AND MEDIUM ENTERPRISES IN VIETNAM

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**ABSTRACT:** *Small and medium-sized enterprises are the majority and main types of enterprises in the economy. This type of enterprise plays an important role in creating jobs, increasing incomes for workers, helping to mobilize social resources for development investment, poverty alleviation, etc. Vietnam's tax policy system currently has many regulations on tax incentives for enterprises to encourage investment development. However, those incentives are not aimed at supporting the development of small and medium-sized enterprises. The objective of the research paper is to analyze the current situation of corporate income tax and value-added tax policies to propose the development of small and medium enterprises in Vietnam and to propose feasible solutions to improve tax policies to support the development.*

**Keywords:** *Small and medium enterprises, Tax policies*

### 1. OVERVIEW OF TAX POLICIES FOR SMALL AND MEDIUM-SIZED ENTERPRISES

**Small and medium enterprises (SMEs)** are growing rapidly in number, accounting for a large number, and have made great contributions to the economic and social development of the country. This is the inevitable result of implementing the renovation policy led by our Party with the main view of developing a multi-sector socialist-oriented market economy, in which, encouraging “Development A healthy, efficient and sustainable private economy has really become an important driving force of the socialist-oriented market economy, contributing to fast, sustainable, and sustainable socio-economic development. stop improving people’s living standards, realize social progress and justice, ensure national defense and security, and soon turn our country into a modern industrialized country.”

**Tax policies** are understood as the perspectives and guidelines of the State related to the use of tax tools in its system of policies. That system of views and guidelines is reflected in the recognition of the role of taxation, the objectives of using tax tools, the scope of impact, the rate of regulation, and orientation in the long term ... to make tax instruments best promote their roles according to the State’s economic and social development strategies and policies.

#### **Concept of SMEs**

According to the criteria of the World Bank Group, SMEs are enterprises with less than 10 employees, small enterprises as those with employees from 10 to less than 200 people and capital of 20 billion or less, and medium enterprises with 200 to 300 employees and with capital of 20 to 100 billion. According to Vietnamese regulations, microenterprises have an average number of employees participating in social insurance not exceeding 10 people per year and total revenue of the year not exceeding VND 10 billion or capital sources not exceeding 3 billion Vietnam dong (VND 3 billion). Small enterprises with an average number of employees participating in social insurance not exceeding 50 people and total revenue of the year not exceeding VND 100 billion or total capital not exceeding VND 50 billion; Medium enterprises have an

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average number of employees participating in social insurance not exceeding 100 people per year and total revenue of the year not exceeding VND 300 billion or total capital not exceeding VND 100 billion.

### **Tax policy impacts on SMEs**

The context of integration is creating great pressure on the Vietnamese economy and business community. Tax support policies are commonly used to facilitate and promote the development of SMEs.

Tax incentives are the Government's solution to promote the SME sector to develop stronger, and create more jobs, thereby contributing much to the State budget in the future, rejecting the preferential view here to let businesses continue to struggle with small and medium-scale, then scale this is also a very important orientation.

### **Forms of support of tax policies for SMEs**

*For corporate income tax:* support through corporate income tax rates; implement corporate income tax exemption and reduction for a definite period; extend the time for paying corporate income tax; investment discounts; tax credits; allows accelerated depreciation; allow transfer of losses.

*For value-added tax:* develop a value-added tax registration threshold; simplify the structure of value-added tax rates; simple value-added tax regime; value-added tax refund; exemption, reduction, or extension of the time limit for payment of value-added tax.

## **2. CURRENT SITUATION OF TAX POLICY IMPACTS SMALL AND MEDIUM-SIZED ENTERPRISES IN VIETNAM**

### **2.1. Current situation of small and medium enterprises in the period of 2016-2022**

SMEs are the “pillar” of Vietnam's economy, accounting for a large proportion of production, consumption, job creation, and tax contributions. In Vietnam today, over 97% are SMEs out of a total of nearly 1 million enterprises across the country.

The number of SMEs in operation is constantly increasing over the years. In 2022, the number of active businesses has increased due to the acceleration of start-ups. In 2022, a record number of newly registered enterprises (148.5 thousand enterprises), an increase compared to previous years.

The increase in the number of startups has contributed to economic growth far exceeding the target (8.02% compared to 6-6.5%) and is a positive signal for the acceleration of start-ups in the coming years.

SMEs have contributed an encouraging proportion of the production value of industries, contributing to the annual budget of the country. Conditions for SME development have been paid attention to by state management agencies and somewhat improved, creating conditions for SMEs to be born and operate.

*In the period 2016-2022, SMEs in Vietnam have achieved many remarkable achievements:*

A great contribution to the economy: In particular, SMEs account for a large proportion of the Vietnamese business community, employ nearly half of the total number of workers and contribute significantly to about 40% of GDP annually. Playing an important role in the private sector, the SME sector has created jobs, mobilized domestic capital sources for production and business activities, and solved social issues promoting the transformation and growth of Vietnam's economy in recent years.

Enhancing competitiveness: Many SMEs have invested in research and development, technology improvement, production management, offering high-quality products and services, improving production and business capacity, creating more jobs, and improving incomes for workers. SMEs develop towards product diversification to meet the needs of domestic and foreign markets.

Strengthening foreign cooperation and investment: Many SMEs have sought opportunities for foreign cooperation and investment, established joint ventures, and cooperated with foreign partners to offer high-quality products and services.

*On the other hand, SMEs still have some drawbacks:*

SME development in Vietnam has not been associated with the common and long-term sustainable interests of the whole society; SMEs are small in terms of capital size, labor, and weak competitiveness; Qualifications and capacity of production and business management of business owners; the technical level, professional expertise and skills of workers in SMEs are still very limited; Machinery and equipment are mostly outdated, have not applied advanced science and technology to production and business activities as well as management; SMEs face capital difficulties and poor self-financing; Product competitiveness is still low, the product consumption market is small; SMEs' ability to link, cooperate and join associations is limited; SME development conditions have improved, but many limitations remain.

According to the statistics of the General Statistics Office, this is a fragile force in the market, especially when the event happened. From 2020 through 2022, due to the impact of the Covid-19 pandemic, an average of over 10,000 businesses withdraws from the market every month. In difficult times, government policies, especially fiscal policies, have a significant impact on SMEs.

## **2.2. Current status of tax policies applied to small and medium enterprises in Vietnam.**

In recent years, the Party and State have promulgated many mechanisms and policies to support SMEs to overcome difficulties and barriers to improve financial capacity, develop production, business and create jobs such as the Law on Enterprises (2014, 2020), Law on Investment (2014, 2020), Law on SME Support 2017, The Law on Value Added Tax, Corporate Income, Import, and Export Tax has had a positive impact on the development of SMEs in Vietnam, creating an open and equal environment for all types of enterprises.

However, small and medium-sized enterprises still face many difficulties, many policies are issued but slow to have guiding documents, leading to many small and medium-sized enterprises being confused in implementation; some policies are not strong enough to create motivate for small and medium-sized enterprises to operate and develop, Although there is no policy discrimination, in fact, compared to large-scale enterprises, SMEs are facing more difficulties and barriers in accessing existing tax incentives.

### **2.2.1. Corporate income tax policy for small and medium-sized enterprises**

Corporate income tax is one of the important sources of revenue of the state budget. Corporate income tax policies are stipulated by the Government in each specific period, to ensure adaptation and suitability corresponding to fluctuations of the business environment, economic cycles, difficulties of enterprises as well as the Government's expectations of policies. In the period from 2016 to 2021, the government has had many policies to support businesses in general and SMEs in particular on corporate income tax to promote national economic development.

Vietnam has gradually reduced the common corporate income tax rate through amendments and supplements to a number of articles of the Law on Corporate Income Tax in accordance with the set roadmap, for small and medium enterprises from January 1, 2016, up to now, the tax rate of 20% has been applied.

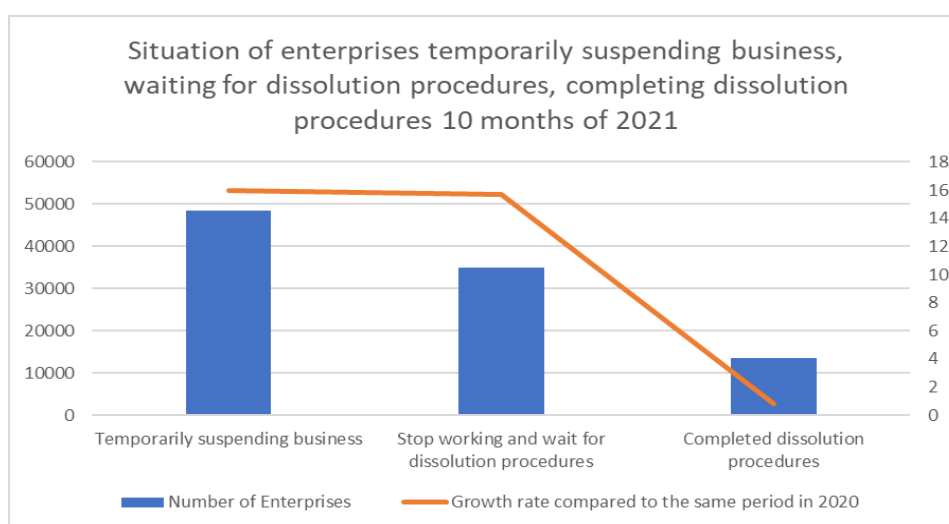
The reduction of the common corporate income tax rate has significantly reduced the contribution obligations of many businesses but has had an impact on encouraging business and creating favorable conditions for businesses to increase accumulation, increase investment, and promote growth.

In the period from the end of 2019 to the end of 2021, the outbreak of the Covid-19 epidemic affected the production and business situation of SMEs, so to support businesses, especially SMEs affected by the epidemic, the government has also launched many economic relief packages amounting to hundreds of trillions of VND. Notably, in addition to economic relief packages, in 2020, the Government implemented many flexible tax policy solutions such as tax exemptions, extensions, fees, land rent with nearly VND 124,000 billion, timely support for businesses and business households to overcome difficulties caused by the COVID-19 pandemic.

Specifically, in 09/2020, the Government issued Decree 114/2020/ND-CP detailing the implementation of Resolution No. 116/2020/QH14 of the National Assembly on reducing payable corporate income tax in 2020 for enterprises, cooperatives, non-business units, and other organizations. Accordingly, the Decree states that 30% of the payable corporate income tax amount of the 2020 corporate income tax period will be reduced in case the enterprise has a total revenue of not more than VND 200 billion.

The Government has also issued Decree No. 41/2019/ND-CP dated 08/4/2020 extending the tax payment deadline for the amount of corporate income tax still payable according to the finalization of the 2019 tax period and the provisional corporate income tax amount paid in the first and second quarters of the 2020 tax period of enterprises, organizations being corporate income taxpayers specified in Article 2 of this Decree. The grace period is 05 months from the end of the corporate income tax payment period following the law on tax administration. According to the General Department of Taxation, as of September 22, 2020, the total amount of corporate income tax extended was VND 30,563 billion, 2.75 times higher than the initial reduction estimate of the Ministry of Finance (VND 11,100 billion).

On April 19, 2021, the Government issued Decree 52/2021/ND-CP dated April 19, 2021 on extending the deadline for paying value-added tax, corporate income tax, personal income tax, and land rent in 2021. Specifically, for corporate income tax: Extend the tax payment deadline for the provisional corporate income tax amount of quarter 1 and quarter 2 of the corporate income tax period in 2021 of enterprises and organizations mentioned above. The grace period is 03 months from the end of the corporate income tax payment period by the law on tax administration.



**Paragraph 1: Situation of enterprises temporarily suspending business, waiting for dissolution procedures, completing dissolution procedures 10 months of 2021**

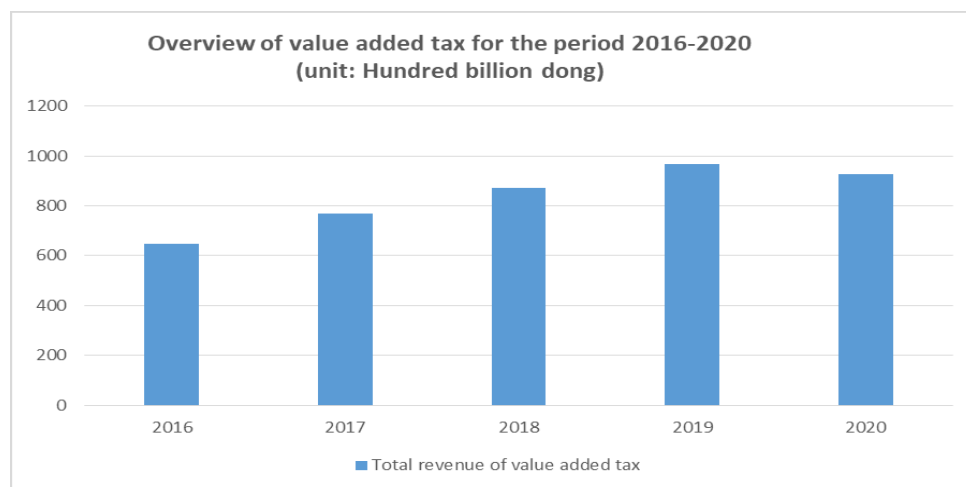
Source: GENERAL STATISTICS OFFICE

Thus, in the period 2016-2021, the Government of Vietnam has had many policies to exempt, reduce and extend the tax payment period to partly support the expenses that SMEs have to spend on corporate income tax in order to promote economic development and reduce the financial burden on SMEs.

Currently, the Ministry of Finance has submitted to the Government for promulgation 2 Decrees (license fees, registration fees) and issued more than 30 circulars to amend 34 types of fees and charges, current in the direction of exemption or reduction of the collection of many fees and charges or Decree 91/2022/ND-CP (effective from October 30, 2022), the temporary payment of corporate income tax in the quarter of 2023 to continue to make policy adjustments to suit the actual situation, as well as continue to the development of the whole business in general and SMEs in particular continue to grow and develop stably.

**2.2.2. Current status of value-added tax policy of small and medium-sized enterprises**

The current status of value-added tax (VAT) policies of small and medium enterprises in the period of 2016-2021 is reflected in specific data including tax rates and tax refund amounts and total state budget revenue from the value-added tax that SMEs have paid and enjoyed.



**Paragraph 2: Overview of value added tax for the period 2016-2020 (unit: Hundred billion dong)**

Source: GENERAL STATISTICS OFFICE

The VAT Law stipulates 25 groups of goods and services that are not subject to value-added tax. In addition to the tax rate of 0% applied to exported goods and services, the Law stipulates 14 groups of goods and services subject to the tax rate of 5%. The remaining goods and services are subject to a tax rate of 10%. The Law on Value Added Tax does not provide for tax exemption and reduction, so to show flexibility in administration as well as adaptation to fluctuations of the economic cycle or the impact of the COVID-19 epidemic, our state has issued policies on value-added tax to support the government. Enterprises, including SMEs, overcome difficulties such as:

In 2020, the Government issued a VAT extension policy under Decree No. 41/2020/ND-CP, which has created many positive effects in supporting businesses affected by the COVID-19 pandemic. This policy allows businesses to extend the VAT payment deadline for up to 5 months without incurring any fees. This gives businesses more peace of mind in managing cash flow and alleviates financial pressure due to difficulties during this time. This policy has contributed to supporting and promoting economic development because it has encouraged businesses to continue operating and investing in its development. According to the General Department of Taxation, the total amount of value-added tax and personal income

tax of households and business individuals extended as of September 22, 2020, is VND 827.8 billion, only 1.34% compared to the initial state budget revenue reduction estimate of the Ministry of Finance (estimated initial reduction of about VND 61,600 billion). This number is too small compared to the estimate, which will affect the operation of enterprises in general, especially the group of SMEs - the most vulnerable group of businesses.

In 2021, the Government also issued Decree 52/2021/ND-CP dated April 19, 2021, extending the deadline for paying value-added tax, corporate income tax, personal income tax, and land rent in 2021. The Decree states and extends the tax payment deadline for the amount of value-added tax incurred to be paid (including the amount of tax allocated to other provinces where the taxpayer is headquartered, the amount of tax paid according to each occurrence) of the tax period from March to August 2021 (for the case of declaring value-added tax by month) and tax period Q1 and Q2, 2021 (for the case of quarterly value-added tax declaration) of enterprises and organizations. The grace period is 05 months for the value-added tax amount from March to June 2021 and Q1, Q2 2021, the grace period is 04 months for the value-added tax amount of July 2021, and the grace period is 03 months for the value-added tax amount of August 2021... Unlike Decree No. 41/2020/ND-CP, Decree 52/2021/ND-CP is said to be more effective and detailed for enterprises, especially SMEs when the group of businesses has been greatly affected by the complicated developments of Covid-19.

In addition, in 2022, to support businesses and people in recovering from the Covid-19 epidemic, the Government has also submitted to the National Assembly for approval Resolution No. 43/2022/QH15 on fiscal and monetary policies to support the Socio-Economic Recovery and Development Program (including regulations on reducing the VAT rate for most items that are subject to a tax rate of 10% down to 8%; At the same time, continue to implement solutions on extension, exemption, and reduction of taxes, fees, charges, and land rent and in the face of fluctuations in gasoline and oil prices affecting production and business and the lives of people and enterprises.

It can be seen that the special attention of the State to businesses in general, including SMEs to stabilize the economy to help businesses overcome difficulties, besides the positive aspects, there are some limitations such as VAT costs are still high for some goods and services, along with the delayed and complicated implementation of the VAT refund policy of state agencies. Therefore, the government needs to make adjustments and improvements in VAT policy to ensure stable development for SMEs and help create motivation for business activities.

### **3. ASSESSING THE CURRENT SITUATION OF TAX POLICIES FOR SMALL AND MEDIUM ENTERPRISES IN VIETNAM.**

#### ***Results***

##### *Corporate Income Tax Incentives*

The results of the implementation of corporate income tax policy for SMEs show that solutions to support SMEs to exempt and reduce taxes in the period of 2016 - 2021 have supported SMEs to enjoy many incentives, save costs, and turn over capital quickly to stabilize production, and business.

In 2020, in order to share difficulties with the business community, economic organizations, households, and business individuals affected by the Covid-19 epidemic, the solution to extend the deadline for paying corporate income tax according to Decree No. 41/2020/ND-CP also helps SMEs use the corresponding money for 5 months with 0% interest rate; At the same time, reducing corporate income tax by 30% for SMEs with revenue of less than 200 billion VND/year helps SMEs have more financial resources to recover production - business when the Covid-19 epidemic is still complicated on a global scale.

In addition, the corporate income tax policy has contributed to the implementation of the development orientations of the Party and the State. Corporate income tax policies contribute to the redistribution of income, ensure social justice and ensure revenue for the state budget. the corporate income tax has created a large, concentrated, and increasingly stable source of revenue for the state budget; contributing to eliminating discrimination between economic sectors and between types of businesses, thereby contributing to creating a healthy competitive environment between economic sectors. The addition of the principle of corporate income tax collection for enterprises investing abroad has helped to reasonably encourage overseas investment to transfer income to Vietnam.

#### *Value-Added Tax Relief Policies*

The regulation of tax rates at 3 levels has ensured compliance with Vietnamese conditions, creating favorable conditions for SMEs to apply as well as gradually approach tax rates in the region and the world.

The law also stipulates a tax refund period after at least 12 months with the tax amount not fully deducted and the minimum tax rate to be refunded for investment and export is VND 300 million (formerly VND 200 million), contributing to overcoming current shortcomings, reducing difficulties for the tax refund fund; contributing to preventing fraud in tax refunds, and at the same time promoting domestic manufacturing enterprises to accelerate the introduction of projects into operation and promote the circulation of goods for enterprises, especially SMEs.

Extending value-added tax in the Covid-19 period according to Decree No. 41/2020/ND-CP has been creating positive effects for SMEs to stabilize and gradually strengthen production and business in 2020, creating a premise for development in the following years, contributing to sharing difficulties mainly for SMEs.

The reduction of value-added tax will contribute to reducing production costs, lowering product costs, thereby helping businesses increase their resilience and expand production and business, creating more jobs for workers. At the same time, it helps businesses reduce costs, remove difficulties for businesses, create conditions for businesses to maintain and stabilize production and business activities in difficult economic conditions, and at the same time encourage morale and create confidence for businesses.

#### *Backward and shortcomings*

In recent years, the Government has issued policies to support the development of SMEs, but the implementation of policies is still limited, and SMEs still face many difficulties in the development process.

#### *Corporate Income Tax Incentives*

The attention to the policies of enterprises is still limited, with many backlogs of corporate income tax fraud. This leads to a loss of state budget revenue, especially in the non-state sector, which focuses on areas such as basic construction, resource exploitation, minerals, private transport business, construction materials business, e-commerce business online sales...

The problem of inconsistent, cumbersome administrative procedures, slow implementation, or enforcement officers causes difficulties for businesses, which can cause businesses to miss the opportunity to take advantage of capital for production and business.

Some enterprises are still confused when applying criteria to identify beneficiaries of incentives according to the provisions of tax exemption and reduction policies issued during this period on the development of supporting industries. Accordingly, the beneficiaries are supporting industry products including new investment projects, technology expansion and innovation projects with the application of new technology equipment and new production processes, with a production capacity increase of at least 20% of enterprises that do not know which criteria will be used to qualify for the support.

The maintenance of two forms of corporate income tax (CIT) incentives is the priority of tax rates and the period of tax exemption and reduction. This, on the one hand, can lead to the risk that businesses “circumvent the law” in the form that after the tax exemption and reduction period, the end of the enterprise will seek to declare losses or make price transfers, evade taxes, or also proceed to dissolve to establish a new business; On the other hand, it will lead to an overlap between the tax rate incentive mechanism.

The extension of corporate income tax under Decree No. 41/2020/ND-CP for small and medium enterprises affected by the Covid-19 pandemic is not large (VND 30,563 billion)/the total number of enterprises affected according to the statistics at the end of 2020 (more than 700 thousand enterprises), leading to low support efficiency. In addition, with the exemption policy of 30% of corporate income tax for enterprises with revenue in 2020 of less than VND 200 billion, enterprises can only use this exemption source in 2021, which cannot be used immediately because they have to wait until the 2020 settlement period.

#### *Value-Added Tax Relief Policies*

Some SMEs take advantage of loopholes in the policy to cheat on VAT for businesses, which has remained a problem throughout the years in sophisticated forms, causing difficulties for businesses and tax management such as:

*Firstly*, enterprises that reduce the output value-added tax payable, increase the deductible input value-added tax.

*Second*, fraud by adjusting the input and output value-added tax not according to regulations.

*Third*, enterprises deliberately misidentify tax rates for services and goods.

Although the policies to remove difficulties for the market to support production and business such as Decree No. 52/2021/ND-CP, Resolution 406/NQ-UBTVQH 15, Decree No. 57/2020/ND-CP, Decree No. 41/2020/ND-CP have supported small and medium enterprises to overcome difficulties, however, SMEs still have to fulfill many tax obligations when their obligations are due, leading to cash flow insecurity to pay tax obligations.

The extension amount according to Decree No. 41/2020/ND-CP is low, the reason is in addition to the value-added tax in the first and second quarters of 2020. In addition, the cumbersome procedure makes it difficult to access. According to a survey on the situation of receiving the first support packages published by the National Economics University, about 80% of surveyed enterprises did not receive the first support package according to Decree No. 41/2020/ND-CP. The reason is that the business does not meet the conditions and/or does not have information about the support policy.

In some cases, it is easy to cause misunderstanding in the issue of applying value-added tax rates on input materials and output products at manufacturing enterprises. In particular, the accounting team of coal enterprises is having difficulty in the process of applying value-added tax exemption, reduction, and extension policies.

#### **4. ORIENTATION TO IMPROVE TAX POLICY FOR SMES IN VIETNAM**

Facing the limitations and difficulties of the business sector in general - SMEs in particular, it is required that the Government synchronously perfect the tax policy system of Vietnam in accordance with the standards of a good tax system according to Circular No. international standards, and at the same time meet the resource requirements for the implementation of the 10-year socio-economic development strategy 2021-2030, including the following main taxes, fees and charges: Value-added tax increase; excise tax; export tax, import tax; Corporate income tax; personal income tax; resource tax; agricultural land use

tax; non-agricultural land use tax; environmental Protection tax; fees, charges and other revenues belonging to the government budget.

The institutional reform related to tax policy with the reform of tax administration institutions will have to be carried out synchronously, including restructuring the tax administration professional process and improving the efficiency of tax administration. Tax management based on risk management platforms, information technology applications and big data. Strengthen the building of tax database to better meet the requirements; research to establish a mechanism to collect information and link information related to taxpayers to identify tax avoidance and tax evasion activities.

### **Solutions to improve tax policy to support the development of SMEs**

#### **For corporate income tax**

Review to amend or abolish tax exemption and reduction preferential policies that are no longer suitable with development requirements and international integration requirements; minimize the integration of social policies with tax exemption and reduction policies, ensure tax neutrality for stable application in the medium and long term.

Implement corporate income tax incentives for small and micro enterprises, and at the same time, shift the focus of foreign investment attraction policies from quantity to quality, and encourage the participation of all economic sectors. in investment in key industries and trades and in areas that need to be encouraged for investment. Broaden the tax base to reflect the country's socio-economic environment and international practices; implementation of standards to prevent and combat transfer pricing - tax evasion, and prevention of income erosion in line with international practices.

Completing and appropriately amending corporate income tax policies depending on specific circumstances and periods:

Firstly, there is a preferential corporate income tax policy for SMEs in the industries that produce products with great added value such as high technology, science and technology; SME incubator, technical base, co-working area to support and invest in innovative start-up SMEs.

Secondly, reducing the tax rate for SMEs, although reducing the corporate income tax rate, will lead to a decrease in state budget revenue, but will stimulate investment, increase GDP, and ensure competitiveness and investment environment. attractive, selective investment attraction and improve investment quality of Vietnam with the region and the world (common at 10%, 15%, 17%, 19% and 20%).

Third, apply the form of the investment tax deduction for SMEs when investing and purchasing fixed assets for the business. One of the difficulties of SMEs is the lack of business capital, so the State can have policies to support businesses when they invest in purchasing fixed assets for production and business through the form of investment tax deduction.

Fourthly, to determine SMEs enjoying CIT incentives, the CIT rate should be based on income threshold instead of revenue. This regulation helps tax authorities reduce administrative costs, create fairness among enterprises of the same size, and contribute to generating stable revenue for the state budget.

Fifth, continue to review and simplify tax administrative procedures for SMEs such as micro-enterprises only submit CIT declarations once a year; The CIT declaration should be simpler in design, requiring only a few items (Revenue; expenses in the year; income in the year; adjustments without attachments or financial statements such as appendices or financial statements such as: Present) ...

Sixth, it is necessary to give strong incentives to income declaration, encourage the implementation of transparent and clear transactions across banks, and properly execute books, records, invoices, and



documents in accordance with the law. At the same time, tax authorities should give recommendations to SMEs about the risks of tax audit and inspection; prosecute before the law...

Seventh, to ensure the clarity, fairness, publicity and transparency of the CIT policy in order to encourage investment and contribute to the realization of the economic re-growth target.

**Regarding value-added tax:**

Expanding the tax base by reducing the group of goods and services not subject to value-added tax and the group of goods and services subject to the 5% tax rate; essentially apply a single rate of taxation.

Research to increase the value-added tax rate according to the roadmap; review and adjust the revenue threshold applying the deduction method to suit reality; research on uniform application of tax calculation method as a percentage of turnover for taxpayers whose turnover is below the threshold or are not eligible to apply the deduction method.

Completing regulations related to value-added tax on exported goods and services, ensuring that they reflect the true nature and international practices. Research to amend and supplement regulations on tax deduction and value-added tax refund in the direction of simplicity, transparency and synchronization with relevant laws./.

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## GREEN CREDIT IN VIET NAM: SITUATION AND SOLUTIONS

Author: Phan Thi Nguyet, Tran Thi Huong<sup>1</sup>

*ABSTRACT: Apparently, green credit is a topic of great interest around the globe nowadays. The green credit model plays a vital role in providing countries with essential capital with a view to achieving their sustainable development goals, especially the environmental and climate ones. In Vietnam, green credit activities have also been implemented in recent years and achieved many encouraging results in a wide range of fields. However, the process of implementing this new growth model is still facing many disparities and challenges. After assessing the current status of green credit activities in Vietnam during past time, this study proposes some recommendations to boost the development of this activity in the coming time.*

*Keywords: green credit, Vietnam*

### 1. RATIONALE

In reality, Vietnam is known as one of the most vulnerable countries to climate change as well as a country with a large open and fast-growing economy. Boosting investment in green infrastructure is therefore very important for Vietnam to meet international commitments on climate and build the resilience to the impacts of climate change, thereby contributing to economic development. In reality, Vietnam has now identified green growth as a strategy for sustainable development, especially in the context of being heavily affected by natural disasters and climate change. In order to implement the green growth strategy, a large amount of capital is required to focus on green projects. Along with the banking system, the capital market in general and the bond market in particular are vital capital mobilization channels for green projects, thereby gradually forming a green credit system to serve national strategic goals on green growth.

Based on those requirements, with the desire for Vietnam's economy to grow in a green way, the expectation of each Vietnamese's more deeply understanding about the importance of green credit and the wishing to offer some valuable solutions to promote green credit, I decided to choose the topic "*Green credit in Vietnam: Current situation and solutions*" for this research paper. The paper provides readers with thorough understanding about the requirements, benefits and importance of green credit and suggests some solutions to promote green credit in Vietnam.

### 2. LITERATURE REVIEW

Prior researches at home and abroad have provided a theoretical foundation for green credit as well as an assessment of the impacts of green credit on economic and social fields, etc. Specifically, Aizawa and Yang (2010) presented that green credit is one of the solutions applied by the financial industry to handle the world's environmental and social challenges through financial instruments. Wang, E., Liu, X., Wu, J., & Cai, D. (2019) assessed the importance of green credit in China, according to which it is necessary to develop strategies, create markets and make room for green economy; to forecast, share and guide in green economic development. Moreover, the government should assist enterprises in developing green economy.

Nguyen Phuong Lien (2022) studied the current status of green credit in Vietnam in terms of implementation organization, capital sources, products, scale, structure and growth rate of green credit. From the results of

<sup>1</sup> Academy of Finance.

analysis and assessment of the current situation and the issues set out in the green credit development of Vietnamese commercial banks according to the characteristics of green credit, the authors of the article recommended useful solutions to commercial banks, to organizations and individuals investing in green projects, to the government and state management agencies to develop green credit, thereby contributing to the successful implementation of the National Action Plan under the 2030 Agenda for Sustainable Development.

In fact, the analysis and assessment of the impacts of green credit on the economy as well as on other fields such as environment, culture, society, etc., always play a crucial role in the development of each country, each region and each locality especially in the context of climate change and that natural disasters negatively affect the world. Based on the changing reality of green credit activities in different periods, the study will make appropriate assessments on promoting the development of green credit, thereby providing scientific evidence to help managers with policies towards the goal of promoting the development of green credit in the context of climate change and strong impact of natural disasters.

With the view to assessing the status of green credit in Vietnam, the study uses qualitative research methods to contribute to clarifying the topic. The qualitative research methods used in this study include: analytic method, method of document collection and comparative method. The above methods help assess the status of green credit development in Vietnam compared to other countries, thereby offering suitable solutions to promote green credit in Vietnam. Research data is collected from the General Statistics Office, the State Bank and Annual reports at a number of Vietnamese banks in the period 2016-2020.

## **2. CURRENT STATUS OF GREEN CREDIT IN VIETNAM**

### **2.1. Green credit for the Vietnamese economy**

Vietnam ranks the world's 42<sup>nd</sup> largest economy. Nevertheless, it is also one of the ten countries with the highest levels of air pollution in the world, according to the World Bank's Environmental Performance Ranking 2021. After Vietnam joined the World Trade Organization (WTO), the economy faced great pressure from member countries, the concern was that domestic goods could not compete with international products, which had set an urgent requirement to actively expand and improve the quality of domestic products.

However, improvements in quality need to closely related to transforming and upgrading operating models in order to meet environmental standards in the right direction of the economy's sustainable development in the new era. Currently, most domestic enterprises are in a state of capital shortage. A series of projects and sustainable development models cannot be implemented because of limited budget supply. Resources for green finance are becoming essential as:

*Firstly, Vietnam is aiming to achieve the goal of sustainable development, so green credit plays a vital role in this process.* In fact, the process of socio-economic development in Vietnam in recent years have not yet been given due attention. According to the World Bank (2017), Vietnam is one of the countries most affected by climate change. The impact of climate change in Vietnam seriously threatens the progress of poverty reduction, the implementation of the Millennium Development Goals and the country's sustainable development. Faced with the above issues, the government has implemented the National Strategy on Climate Change and updated the scenarios to respond to climate change and sea level rise, emphasized the link between climate change sustainable development, while recognizing climate change as a common challenge that requires the cooperation of the whole society.

*Secondly, this is a real fiscal space to which commercial banks need to pay attention, especially in the context of increasingly positive liquidity and capital input.* Experience from countries around the world indicates that green growth projects often had difficulties in mobilizing capital since the State could

only aid a small part, the rest would be self-financed from other sources. Therefore, this is the “land” that brings many sustainable benefits to credit institutions (profit, prestige, etc.) and provides businesses and the community with loans.

In Vietnam, according to Article 149 of the Law on Environmental Protection No. 72/2020/QH14 passed by the XIV National Assembly on November 17<sup>th</sup>, 2020, green credit is a credit granted to the following investment projects: (i) Using natural resources effectively; (ii) Response to climate change; (iii) Managing waste; (iv) Treating pollution, improving environmental quality; (v) Restoring natural ecosystems; (vi) Conserving nature and biodiversity; and (vii) Generating other environmental benefits.

## **2.2. Current status of green credit in Vietnam**

### **• *Green credit development policy***

In order to promote the development of green credit to implement the guidelines and strategies of the Party and State on green growth and sustainable development, over the years, the State Bank of Vietnam (SBV) has issued many mechanisms and policies to create a legal basis for this activity, which starts with Directive No. 03/CT-NHNN on promoting green credit and managing environmental and social risks in credit granting activities. Following that, the State Bank issued Decision No. 1552/QD-NHNN dated August 6, 2015 on the Action Plan of the Banking sector to implement the National Green Growth Strategy for the period 2015-2020; Decision No. 1604/QD-NHNN dated August 7, 2018 on approval of green banking development project in Vietnam; Decision No. 1731/QD-NHNN dated August 31, 2018 promulgating the Action Plan of the Banking sector to implement the 2030 Agenda for Sustainable Development.

In addition, in order to concretize the orientations and goals for green credit development and green banking, the SBV has issued many documents guiding lending and credit granting activities to ensure compliance with the Law on Environmental Protection, such as: Circular No. 27/2015/TT-NHNN dated December 15, 2015 of the Governor of the State Bank of Vietnam guiding the implementation of loans for production afforestation and livestock development in accordance with the provisions of Decree No. 75/2015 /ND-CP dated September 9, 2015 of the Government on mechanisms and policies for forest protection and development, associated with the policy of rapid and sustainable poverty reduction and support for ethnic minorities in the period 2015-2020 ; Circular No. 39/2016/TT-NHNN dated December 30, 2016 of the Governor of the State Bank regulating lending activities of credit institutions (CIs), foreign bank branches to customers.

In addition, the SBV also cooperated with a number of international organizations to develop guidelines for credit institutions to identify and make statistics on credit granting activities for 12 green areas, to issue a manual to guide credit institutions to conduct credit assessment environmental and social risks in credit granting activities to 15 economic sectors with high risks to the social environment.

Along with the issuance of the above documents, the SBV has researched and developed mechanisms, policies, schemes and projects in order to develop modern banking services using high technology, contributing to the green growth, such as: Completing the legal framework in the field of payment; Deploying the non-cash payment development project; The scheme to promote payment through banks for the collection of fees for public services; Developing payment facilities and services via the Internet, via mobile phones, via QR codes; submit to the Prime Minister a scheme on experimental management mechanism for financial technology (Fintech) activities in the banking sector; Research on the topic of Blockchain technology or distributed ledger technology to have an effective solution to perfect the legal framework, thereby creating a foundation for the development of the Fintech field...

Furthermore, the State Bank also actively participates in directing the implementation of green credit programs in some sectors and fields such as submitting to competent authorities for promulgation according to their competence preferential credit policies on interest rate support, and preferential collateral for customers implementing agricultural production projects along the value chain, hi-tech agriculture, and clean agriculture; Implementing loan programs for planting production forests according to Decree No. 75/2015/ND-CP dated September 9, 2015 of the Government; Implementing programs to support the poor in housing to prevent climate change such as loan program to build houses to prevent storms and floods in the Central region, to build houses in flooded areas of the Mekong Delta; credit programs that contribute to reducing greenhouse gas effects and reducing environmental pollution such as rural clean water and sanitation programs...

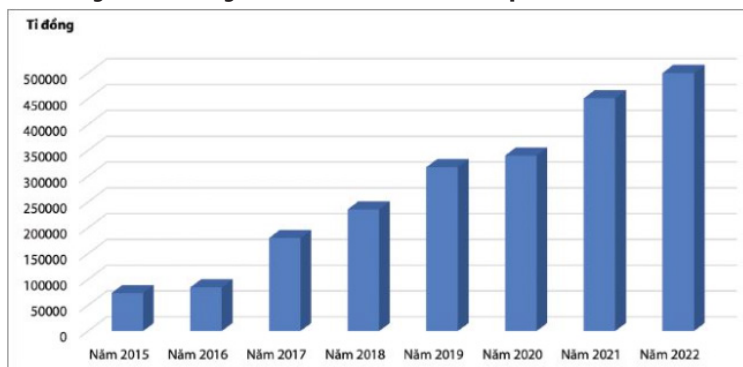
In order to strengthen the capacity of credit institutions in implementing green banking - green credit, the SBV has implemented many activities such as: Organizing programs and training courses to foster capacity for credit institutions and individuals participating in the development and implementation of mechanisms, policies, programs and products of green banking - green credit; Strengthening internal communication in the industry with diverse forms and rich content to raise awareness for officials, civil servants, public employees and employees of the Banking sector about the role and objectives of the national green growth strategy; Increasing resource mobilization from international financial institutions and bilateral and multilateral donors in order to diversify capital sources and improve financial capacity for credit institutions to implement green credit; Coming up with measures to encourage focusing on bank credit capital for projects, business production methods and investment in industries or fields to mitigate as well as adapt to climate change...

Under the drastic direction of the State Bank and appropriate organizational and implementation solutions, with the participation of credit institutions with a high sense of responsibility, the green credit policy has been implemented rapidly and is now put into effect.

- **Green credit development results**

By the end of 2022, credit balance for green projects (12 green projects built and issued by the State Bank of Vietnam since 2015) reached nearly VND 500,000 billion (accounting for about 4.2% of the total outstanding loans of the economy), focused on areas such as renewable energy, clean energy (accounting for the highest proportion 47%), followed by green agriculture (over 30%) (Figure 1). Credit institutions actively carry out assessing environmental and social risk in credit granting activities with outstanding loans of more than VND 2.2 million billion with more than 1.1 million loans.

**Figure 1. Total green credit balance for the period 2015-2022**



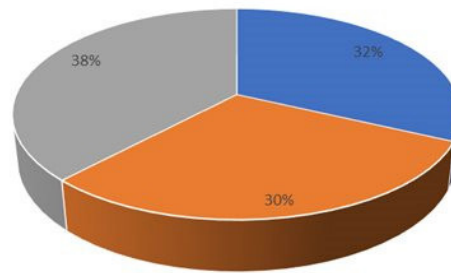
Source: Credit Department for Economic Sectors, SBV, 2022

Regarding interest rates, to support green projects of businesses and people, depending on the capital mobilization conditions and financial capacity of each bank and the nature of each field, credit institutions

have applied different interest rates, but the average rate is lower than normal lending rates in the market. Specifically, lending interest rates have been applied by credit institutions for short-term green fields from 5-8%/year, medium and long-term from 9-12%/year.

In terms of structure, green credit balances focus on two main areas which are renewable energy, clean energy and green agriculture. Specifically, the proportion of outstanding loans in the field of green agriculture in the total outstanding green credit in 2021 is 32% which decreases 8 percentage points compared to 2020 (40%); In contrast, the proportion of outstanding loans in the field of renewable energy and clean energy increased from more than 30% (2020) to 46% (2021). It can be seen that green credit for renewable energy, clean energy has had a breakthrough with total outstanding loans increasing by more than 100% (from nearly 100 trillion to more than 200 trillion) in 2021.

**Figure 2. Green credit structure in 2021**



*Source: Report on implementation results of green banking development project in Vietnam in 2021*

Up to December 31, 2021, there were 38 credit institutions with green credit balance, of which 24 credit institutions (63.16%) had green credit balance growth in 2021.

Interestingly, green credit balance is still highly concentrated in a few credit institutions. However, the concentration level has decreased compared to the previous year, which depicts that more and more credit institutions, especially small credit institutions, had focused on developing their green credit activities.

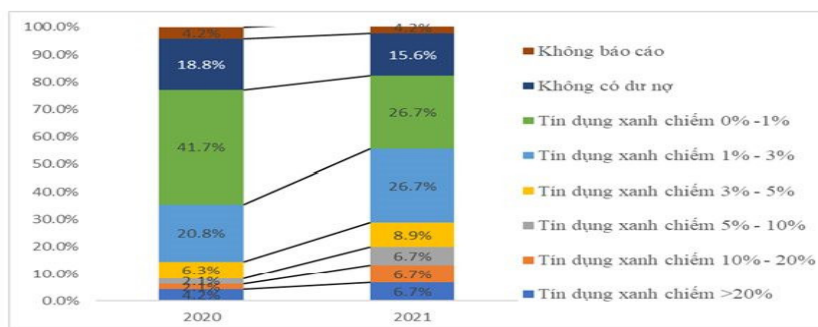
In respect to green credit balance scale, in general, credit institutions had had larger and larger green credit balances. By the end of 2021, there were 6 credit institutions with outstanding green credit of over VND 20,000 billion; 10 ones had green credit outstanding from 1000 to 10,000 billion dong; 12 ones had outstanding green credit from VND 100 billion to VND 1000 billion.

**Figure 3. Current status of green credit balance at credit institutions (according to the scale of outstanding loans)**



On the subject of the proportion of green credit outstanding on the total credit balance at each credit institution, the number of credit institutions with a high proportion of green credit outstanding tends to increase and the number of credit institutions with a low proportion of green credit outstanding tends to reduce. Up to December 31, 2021, there were 3 credit institutions with the proportion of green credit outstanding of from 10% - 20%; 3 credit institutions with green credit balance proportion of from 5% to 10%; 4 credit institutions had green credit balance from 3% to 5%; 14 credit institutions had a green credit balance proportion of less than 1%.

**Figure 4. Green credit balance to total credit balance at each credit institution**



Source: Report on exploiting the Green Bank development project in Vietnam in 2021

In general, in 2021, the goal of increasing the proportion of credit capital for green sectors and fields continued to be improved. The outstanding balance of green credit not only continued to increase, but also increased at a faster rate in the context of the economy being heavily affected by the Covid-19 pandemic. This reveals that credit institutions are increasingly focusing on providing green credit. In addition to the large group of credit institutions, small ones have also gradually increased the size and proportion of green credit, accounting for a larger proportion of the total green credit outstanding of the whole system.

- Limited and causes

Although many important results had been achieved, the green credit policy still had some shortcomings and limitations such as: lack of legal basis for green credit activities, lack of specialized guidance of specialized agencies on the list of green sectors and fields with specific criteria as the basis for state management agencies to develop mechanisms and incentives to encourage green activities and grant green credits; lack of an interdisciplinary cooperation mechanism to stimulate businesses to invest in green fields and to encourage banks to develop green credit.

On the side of credit institutions, the mechanism of mobilizing to create capital for green credit had not really been effective while accessing to preferential capital for green credit from international financial institutions (WB, ADB or funds for environmental companies, support funds...) with many difficulties. In reality, there are a wide range of credit institutions interested in and promulgating internal processes on green banking, green credit, appraisal process for green projects was not in large quantity. Furthermore, the capacity to assess environmental and social risks of many bankers was still weak, etc.

### 3. SOME RECOMMENDATIONS

#### Firstly, Measure and control criteria on green credit quality.

In general, the common problem of commercial banks in Vietnam is that they have only developed green credit from a macro perspective without specifically separating quantitative criteria such as measuring outstanding green credit, income from green credit, green credit market share, etc.

The figures given are still not clearly separated from green credit, income from green credit or outstanding green credit. Therefore, commercial banks in Vietnam need to develop tools to measure and

evaluate in detail the outstanding green credit and efficiency of green projects. Thus, commercial banks in Vietnam can control green credit and contribute to the development of green banking activities in Vietnam.

### **Secondly, Propagate and raise awareness about green credit**

Due to the lessons acquired from other nations, it is vital to take action to spread and broadly disseminate information in order to increase banks' awareness of the advantages and efficacy of providing green credit.

Besides, it is necessary to make banks believe that participating in and well implementing regulations on environmental risks will not only help the socio-economy in the direction of green development in general but also bring new business opportunities for banks, help the bank develop sustainably. At the same time, it is necessary to strengthen education and training on environmental awareness and responsibility of enterprises as well as help businesses understand the conditions for loans from green credit programs, so that they can actively adjust their operations and access loans from green credit programs.

In addition, after receiving green credit capital, enterprises need to use it responsibly and effectively, thereby gradually building trust between banks and enterprises in green credit development activities.

### **Thirdly, Developing a legal framework on green credit**

The prerequisite lesson of these three countries for Vietnam is that it is necessary to soon develop policies and operating mechanisms of green credit. The success of South Korea, China and the United States has a significant role of the government and regulators.

As a result, the Central Bank should release green credit guidelines shortly, as the majority of financial institutions currently lack any formal guidelines or strategies for managing customers' socio-environmental risks. Prior to directing the creation of green banks for credit institutions, the Central Bank must develop and issue guidelines.

In reality, the Central Bank shall provide instructions on how to create a report regarding green banks and green credits simultaneously, including the standards and reporting requirements to guarantee the following elements: governance and organizational structure, policy system and financial capacity, process management, internal controls and information disclosure; Out of the twenty-one economic sectors in total, the authors study and finish the Manual on Environmental and Social Risk Assessment for the sectors that have not yet offered instructions for loan-granting activities of credit institutions.; update the Green Project Portfolio on a regular basis.

### **Finally, Foster international co-operation**

Globalization has opened up various opportunities for people to implement green credit activities quickly and efficiently, so to take advantage of those opportunities. In order to help commercial banks have a foundation to gradually become more environmentally friendly, the Government and the Central Bank must work with international organizations and more developed nations to develop common environmental policies, facilitating the emergence of green banks in Vietnam.

Encourage international collaboration to exchange knowledge, conduct research, and gain experience in order to adapt green credit activities to the nation's current condition in a scientific and appropriate manner.

Promote international cooperation to build a legal corridor for green credit.

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## ATTRACTING VENTURE CAPITAL TO INNOVATIVE START-UPS

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*ABSTRACT: Vietnam has thousands of innovative start-ups operating and funded by large domestic and foreign investment funds, however, ensuring working capital for operation and development is one of the great issues that startup businesses have been faced with. The study is conducted to point out the context as well as the achievements and limitations of attracting capital to Vietnamese innovative startups in the period 2018 - 2022. The results show that: the innovative start-up ecosystem in Vietnam still has a lot of barriers and is less competitive compared to other countries. The limitations are mainly due to the lack of facilities for research, limited financial support from the state budget and the scarcity in quantity and quality of high-tech human resources. Consequently, capital flowing into this kind of business becomes less and less, which calls for Governments' actions to address the situation.*

*Keywords: venture capital supply; legal corridor; technology; innovative startup ecosystem.*

### 1. INTRODUCTION

Up to now, Vietnam has hundreds of startup ideas that have been seeded, created and connected with the community and investment funds. With strong international economic integration, Vietnam is attracting more and more attention and capital from various businesses from different countries and regions such as the US, European Union, Japan, Korea, Taiwan, Loan, Singapore, China, etc. Some foreign investors even have the intention to establish a venture capital fund in Vietnam. Start-ups in general and innovative start-ups in particular have been contributing to economic growth, innovation and job creation for the domestic labor market. Despite the impressive growth rate, Vietnamese innovative startups are facing many barriers in the process. Securing capital for operation and development is one of the core issues that need attention of every startup business. It is clear that finance is an important cause that needs to be addressed quickly and promptly in the near future. The article analyzes the current situation encountered in the process of calling for investment capital for innovative start-ups and at the same time suggests some solutions to help enterprises open up capital in the period of industrial revolution 4.0 and become a vital driving force for national economic growth. Because of these opportunities and challenges, it is necessary to conduct research on the issue of "Attracting venture capital for innovative start-ups" to propose solutions.

### 2. THEORETICAL FRAMEWORK

#### 2.1. Theory 1: Venture capital

##### 2.1.1. Concepts and characteristics

###### 2.1.1.1. Concepts of venture capital

In terms of semantics, in English, the term "Venture" means in general an act of taking risks. Venture capital is a risky investment.

<sup>1</sup> Academy of Finance.

<sup>2</sup> Academy of Finance, CQ58.08.05.

In economic terms, venture capital is a general term to describe the investment in special technology or scientific projects that are in a state of “thirst for capital”, typically small and medium-sized companies, newly established ones or those in the start-up stage, having a good business idea or plan.

In addition, this term in each region has different interpretations.

In Asia, the term refers to equity investment in small and medium-sized enterprises, which are unlisted on the stock market and, to some extent, involve investors in the public management process.

In Europe, according to Natwest Bank - United Kingdom, the term means an activity managed by organizations or individuals making long-term investments with high financial risk for small and medium-sized enterprises, newly established or developed, not listed on the stock market but with growth potential. This is the common understanding of European countries about the term and is considered to be understood in a broad sense.

In the United States, according to the American Venture Capital Association, venture capital is capital investment in startups, young enterprises, those unlisted on the stock market but capable of rapid growth, innovation and technology-based. This is considered a narrow sense and is widely accepted.

*Overall, it can be given a general concept of venture capital: It is a combination of investment and financial activities, carrying high risk but also full of potential for profit. It includes not only investment in the high-tech sector, but also all other activities in the economy.*

#### 2.1.1.2. Characteristics of venture capital

Venture capital has two main characteristics:

(1) It is essentially a form of capital business. Venture capitalists provide capital primarily for startups, usually in the high-tech sectors with strong innovation and high growth potential.

The failure rate of businesses in the early stages can be very high, up to 80-90% - a high level of risk, but if successful, it will make great profits.

(2) The venture capital providers not only invest capital, but also use their accumulated experience, knowledge and networks to support enterprises to manage their business better. Instead of a return on capital and interest on the investment, the venture capital providers only require holding some shares, sometimes controlling the organization and business strategies of the companies receiving the capital.

*In essence, venture capital is a form of capital business, in which people have capital through experienced investors to invest in immature and highly profitable businesses.*

### **2.1.2. Venture capital fund and its models**

#### 2.1.2.1. Venture capital fund

A venture capital fund is a specialized investment fund. That is reflected in the fact that it specializes in providing capital by the method of venture capital in a number of fast-growing and mainly high-tech sectors. Therefore, it can also be considered a type of growth fund. In addition, some venture funds specialize in investing in a certain area or a certain country (country fund), or in another venture fund to split the risk which is called a fund of funds.

#### 2.1.2.2. Characteristics of venture capital fund

The fund is often associated with venture capital and its activities. Therefore, the characteristics of this fund are also inseparable and are derived from the characteristics of these activities.

(1) The risk of investments: Venture capital has a very high risk because the recipients of the capital are newly established private companies or active in newly formed fields.

(2) Duration of investments: most are medium to long term. The recipients of the capital are mainly private joint stock companies, unlisted on the stock market, even in the ideation stage.

(3) Investors: the investors are usually organized ones such as pension funds, university sponsorship funds, insurance companies, businesses or a few wealthy individuals.

#### 2.1.2.3. *Venture capital fund models*

- Limited partnership model
- Trust unit model
- Limited liability company model
- Joint stock company model

### **2.1.3. Factors forming and affecting the development of activities of investing and attracting venture capital**

#### 2.1.3.1. *Forming factors of venture capital*

According to Ronald J. Gibson and Bernard Black - Journal of Applied Corporate Finance (Pages 36 – 48, 1999), “Venture capital is an investment made by specialized organizations to fast-growing, high-risk and often high-tech companies in need of equity to finance product development or growth.”

Venture capital can be formed from a variety of sources, the most common of which is the issue of shares.

##### *\* Participants of venture capital activities*

- Investors: Wealthy individual capitalists (or angel capitalists), banks, insurance companies, pension funds, manufacturing corporations, etc. have large amounts of money ready to invest and accept high risk, hoping to achieve big profit.

- Self-investing individuals: The initiative of investors is very high. They have visions and seize opportunities by choosing the appropriate investment recipients, then receiving all the profits earned without sharing to any other parties.

- Investment organization: many investors contribute capital together to make investments towards a common goal.

- Venture capital managers: venture capital experts who have both technology knowledge and management capacity, and can also take on the function of raising capital from investors, searching and evaluating investment opportunities, conducting investments according to certain strategies to add value to the investee company, and then exiting capital to recover capital and profits, at the end, returning to investors.

#### 2.1.3.2. *Factors affecting the development of activities of investing and attracting venture capital*

##### *\* Structure of financial markets*

Conditions to be listed in the stock market should be changed to suit the needs of businesses, disclosure requirements should be maintained strictly to ensure investors' belief.

##### *\* Ability of human resources*

Venture capital markets can only prosper with an adequate supply of businesses. The ability of human resources also determines the development of new companies.

##### *\* Investment opportunities*

Availability of investment opportunities is related to a number of factors:

- The level of development of the research and technology environment.

- Channels between research and the venture capital industry.
- Ease of access for businesses to the domestic market.
- Ease of starting a company for the first time.
- The authority of the legal system to ensure business opportunities are not turned into opportunities for corruption by officials and other forces.

*\* Government policies*

Based on the mechanism, government policies can be classified into 3 types:

- Governments act as the market maker.
- Government policies and regulations of venture capital activities directly affect the industry.
- Laws and regulations of the federal pension fund, stock market, labor market and other areas indirectly affect the venture capital industry.

## **2.2. Theory 2: Innovative startup**

### **2.2.1. Startup ecosystem**

#### *2.2.1.1. Concepts*

Startup ecosystem is set up by a country or a city to promote local entrepreneurship. The innovation startup ecosystem consists of individuals, groups of individuals, innovative start-ups and entities supporting the development of start-ups, including state policies and laws; infrastructure for starting up; capital and finance; startup culture; startup support organizations, coaches and consultants; universities; training course for individuals or groups of individuals starting a business; startup investors; human resources for startup; domestic and international markets.

#### *2.2.1.2. The core and foundation part of startup ecosystem*

The core part includes the factors directly involved in the start, incubation of a startup idea and the realization of turning that idea into a real business activity in accordance with the right goals and startup blueprints, such as ideas, individual entrepreneurs, venture entrepreneurs, start-up groups, investment capital, startup coaches, various organizations and individuals involved in the process.

The foundation part is the factors in the outer circle, which makes up the macro foundation for start-up activities, including organizations supporting start-up incubators to provide office and coworking space; large companies acting as investors or customers; universities or research institutes acting as the biggest source of knowledge and startup ideas; funding institutions, service providers.

The core part of the startup ecosystem has a direct role in implementing, conducting start-up projects and determining the success of the startup movement. In the long term, the foundation part is the agents that create the macro environment for startups to flourish.

### **2.2.2. Concepts of innovative startups**

Startups are companies that are in the process of starting a business in general, associated with the pinnacle of science and technology, operating things that the world has never done. An innovative startup is an organization designed to deliver products and services under the most uncertain conditions and with the fastest growth opportunities, building a new market segment, creating distinctive; is the process of starting a business based on creative ideas, creating new products; or old products but have other outstanding and superior points compared to products and services that were already on the market and have rapid development.

### **2.2.3. Characteristics of innovative startups**

\* Breakthrough and creativity: Breakthrough and creativity are inevitable in business activities under the context of Industry 4.0. The value of intelligence and creativity greatly contributes to the breakthrough and determines the competitiveness of innovative start-ups. Innovation is a must to be able to create a better value than what is already available.

(2) Huge growth and profit potential: Innovative start-ups are passionate about fast growth and creating a business model with that pace and replicating it. An innovative start-up will not set limits on growth, and the owners have the ambition to develop it to the greatest extent possible. When the plan is successful, the financial returns can be huge.

(3) Hard start and high risk: The capital of innovative start-ups starts from the founder's own money, or donations from family and friends, in some cases, crowdfunding. However, most of these start-ups have to raise capital from Angel Investors and Venture Capital Funds.

Innovative start-ups have a unique startup idea or are different/better than competing solutions in the market. This makes the implementation uncertain and of course quite risky.

Innovative start-ups always lack resources (mainly time and money) because their target market is large, meanwhile, product development requires a lot of testing and re-implementation. The key is to find the right balance between development and implementation. The ultimate goal is to get to the growth stage of that business earns revenue as quickly and cost-effectively as possible.

## **3. RESEARCH METHOD**

The study uses some research methods: research, analysis and synthesis of relevant documents such as books, newspapers, domestic and foreign reports with clear verification to build a theoretical basis for the study of capital and venture capital activities, to discover common characteristics of research subjects and to save important information directly related to the research problem. Then linking and organizing documents and theoretical information that have been obtained to create a theoretical system on the topic of the research. Methods of data collection and information processing to collect data from scientific studies, articles and research papers related to venture capital activities and find research gaps, at the same time, inherit the scientific theory and build the theoretical basis of the research problem.

## **4. RESULTS AND DISCUSSION**

### **4.1. Results**

#### **4.1.1. The current state of innovative startups in Vietnam**

##### *4.1.1.1. Number of innovative start-ups in Vietnam*

According to the statistics of Echelon Magazine (Singapore), Vietnam as of September 2018 had about 3,000 innovative start-ups - an increase of nearly 2 times compared to the data at the end of 2017. This was a pioneering force of enterprises, with high growth to effectively contribute to the country's socio-economic development. Regarding financial activities, there were about 40 venture capital funds operating in Vietnam. Calculated in the two years 2018-2019, the total number of innovative start-ups accounted for the majority in terms of the number of new registrations. The growth rate of successful innovative start-ups is many times faster than that of large enterprises.

According to the assessment of the Vietnam Chamber of Commerce and Industry (VCCI), if calculated per capita, the number of innovative start-ups in Vietnam is higher than that of other countries such as China,

India or Indonesia. The comparison between the fields shows that information technology enterprises have superior numbers compared to those in other fields. This fact reflects the development trend in the context of the industrial revolution 4.0.

Although the number of innovative startup investors is not much, it has started to go up. Most of these are successful entrepreneurs who want to invest in the next generation of innovative start-ups. Some overseas Vietnamese and students have been returning to Vietnam to participate in innovative startup investment. The activities of angel investors in Vietnam have started to be more systematic through connecting and forming a number of clubs and investment networks for innovative start-ups such as VIC Impact, iAngel or VCNetwork.co.,...

#### *4.1.1.2. The scale, level of technology development and ability to raise capital*

The level of technology underpins innovation. The technological level of enterprises makes an important contribution to creating conditions for the spirit of starting up.

In Vietnam, published survey data in 2018 showed that, out of a total of 7,450 enterprises surveyed, only 464 enterprises confirmed to have research and development (R&D) activities, accounting for 6.23%. This means that the majority of businesses have not yet paid attention to the application of science and technology. However, in the period of 2018-2020, the fields selected by innovative start-ups focused on financial technology, travel technology, artificial intelligence/chatbot, Internet of things, care health and big data collection according to the development trend of the industrial revolution 4.0.

Investment in innovative start-ups in Vietnam mainly comes from investment funds, large corporations, business promotion organizations and individual investors from both domestic and international. In general, raising capital and calling for investment of innovative start-ups are taking place more and more actively. Large deals mainly come from foreign investors, while domestic ones have not yet boldly invested in start-ups. According to the research by Topica Founder Institute, the amount of foreign capital and venture capital funds poured into innovative start-up businesses in Vietnam has tripled in the period 2016 - 2020 (US\$205 million to nearly US\$900 million) with the number of brands nearly doubling (50 deals to 92 deals). In 2017-2018, many Vietnamese corporations invested in innovative start-ups such as FPT Investment Fund (FPT Ventures), Viettel Investment Fund (Viettel Ventures), CMC Innovation Fund. In the year 2018-2019, according to statistics of the Ministry of Science and Technology, only the 5 most successful capital raising deals have a total value of more than 50 million USD. Meanwhile, according to data from the National Program 844 (Ministry of Science and Technology), the total value of investment deals in Vietnamese start-ups from the beginning of 2020 up to now is 290.43 million USD; the number of investment deals is 56 deals, of which 34 investment deals are announced. The number of investment deals in Vietnam is increasing, but the number of deals under 1 million USD accounts for the majority. The number of deals receiving investment with a capital of more than 10 million USD is very small. The number of M&A deals is still very small. No innovative start-ups have yet to conduct an IPO.

#### *4.1.1.3. Growth potential*

The start-up and innovation network is developing strongly in localities across the country. Provinces and cities actively apply information technology in digital transformation, product traceability, intellectual property and sustainable socio-economic development solutions in industries and sectors. On the ranking of the Global Innovation Index (GII), for 12 consecutive years, Vietnam has always performed higher than the level of development. In addition, since 2017, Vietnam has used the Global Innovation Index, published annually by the World Intellectual Property Organization (WIPO), to recognize the pace of innovation.

Start-up enterprises have created many new jobs applying science and technology for employees, at the same time, promoted economic growth and contributed to the formation of a market economy. For Vietnam, innovative start-ups contribute to deepening international economic integration on many levels, diversifying forms, and gradually adapting to the principles and standards of the global market.

#### **4.1.2. The current situation of attracting venture capital for innovative startups in Vietnam**

In the context that the industrial revolution 4.0 has been taking place strongly, Vietnam has steadfastly adhered to the policies of innovation, reform and development, proactively and actively restructured the economy to innovate the growth model, to consider science, technology and innovation to be important driving forces and the key to rapid growth as well as sustainable development. Vietnam is also likened to a peak of Southeast Asia's "golden triangle" in startup development - a bright spot in attracting investment when it is a "good land" for high-quality foreign direct investment inflows. Because of that, the COVID-19 pandemic has again become a catalyst for innovation and digital transformation in Vietnam. The domestic innovation and startup ecosystem has recovered and reached new heights in the last two years. Venture capital for start-ups in Vietnam reached a record high in 2021 with a total investment of \$1.4 billion - up 1.5 times from the record \$874 million in 2019. Thanks to the convenience of online webinar applications, travel restrictions are no longer a barrier in the investment decision-making process. The total investment capital in innovation in 2021 has surpassed a record number \$874 million in 2019 and far ahead of \$451 million in 2020. Also in this year, the taste of investors also changed rapidly to focusing on fields that were not strongly affected by the pandemic. Vietnam has welcomed the arrival of two new tech unicorns - Momo and Sky Mavis (valued at \$2 billion and \$3 billion) during the pandemic.

In the first nine months of 2022, investment in technology in Vietnam witnessed a slight decrease compared to 2021. Total investment capital poured fell by 17.9%, while the number of deals decreased by 13%. However, in the face of the ups and downs of the world economy, the picture of technology investment in Vietnam in the first 9 months of 2022 still shows persistence. The capital inflow to companies in the later stages is maintained at the same level as in 2021, in which the series B round recorded a record level in both investment value and number of deals. Vietnam also hit a record in the number of transactions with the capital raising scale reaching 10-50 million USD. That shows companies that raised Series A (Pre-A) and Series A pre-round funding in 2021 have grown into the next stage. The number of deals worth 3 - 10 million USD and more than 50 million USD are equal.

Among the industries selected for investment, the retail industry continues to be the leading group in terms of the amount of investment capital poured in, followed by the financial services (fintech), health sector, education sector. It can be said that, in general, Vietnam's digital economy is still at a stage of rapid development in the region, still has a lot of potential to receive venture capital from investors.

#### **4.1.3. The current situation of venture capital supply**

The field of venture capital investment in Vietnam has grown since 2004 with the establishment of International Data Group Ventures Vietnam (IDGVV), founded by Patrick McGovern - Founder and Chairman of IDG. From 2004 to 2013, IDGVV invested in 42 companies, developing into multiple industries - both in technology and non-tech. Another investment fund in this industry is CyberAgent Ventures (CAV) - a venture capital fund in Japan that entered the Vietnamese market in 2008, has invested in more than 25 companies in Vietnam. There is also DFJ VinaCapital - a joint venture between VinaCapital - one of Vietnam's largest private equity funds and Draper Fisher Jurvetson (DFJ) - an American venture capital firm focused on early-stage and growth investments.

Founded in 2014, the Startup Vietnam Foundation (SVF) is the first and only socialized, non-profit fund in Vietnam to support the open innovation ecosystem. Continuously for 5 years, SVF has contributed to building the ecosystem throughout the territory through activities to improve local core competencies, training the leadership team of businesses/startups.

However, due to the wave of COVID-19 pandemic and the global economy experiencing many significant changes, the issue of lack of investment capital for innovation has become even more urgent. Alternative sources of funding such as venture capital funds are considered to have a vital role in encouraging entrepreneurship, promoting innovation and thereby promoting economic growth under the new normal.

It can be said that the financial resources for investment in technological innovation in Vietnam are still very limited. Barriers from loan guarantees by credit institutions have limited enterprises to borrow medium and long-term capital for innovation investment. The activities of the Development Assistance fund are similar, but with more favorable interest rates and only limited to those who have needs in a number of areas regulated on the State's development investment credit. Other sources of capital mainly come from international organizations such as ADB, WB... and bilateral trade agreements.

#### **4.1.4. Achievements**

According to statistics of the Ministry of Science and Technology (2021), Vietnam currently has more than 1,400 organizations capable of supporting startups, of which 196 coworking zones, 69 business incubators and 28 organizations promoting business activity have been established. The number of Venture Capital Funds considering Vietnam as a target market has 108 funds operating in Vietnam, of which 23 have Vietnamese legal entities and 23 are pure Vietnamese funds.

In 2021, the market recorded 165 investments in startups, attracting more than 1.44 billion USD. The Vietnamese startup investment market is forecast to reach \$2 billion by 2022. By the end of the first quarter of 2022, the Vietnamese startup market has marked a potential start with outstanding deals in the financial technology and e-commerce segment such as Square Peg's investment in Timo digital bank, VNG's and Do Ventures' investment in digital software solutions company Open Commerce Group.

Besides, the value of deals is increasing. In the 5 years from 2016 to 2021, many venture capital deals worth more than 10 million USD were made. According to a report by the National Innovation Center (Ministry of Planning and Investment) and Do Ventures, Vietnam is assessed as one of the most promising venture capital markets in ASEAN. Specifically, Vietnam currently leads Southeast Asia in the growth rate of venture capital transactions. Compared to 2020, the number of venture capital transactions in Vietnam in 2021 has increased by 57%. Investment growth rate in Vietnamese startups is higher than that of Singapore, Philippines, Indonesia, Thailand and Malaysia. In terms of investment capital, Vietnam is currently ranked 3rd in ASEAN in terms of capital growth rate for start-up investment.

Technological unicorns and typical businesses such as MOMO, VNPay, or TIKI are such achievements in efforts to promote innovation activities in Vietnam. At the same time, the statistics show the important role of the venture capital fund market in the development of the startup ecosystem in Vietnam, realizing innovative ideas in enterprises and providing abundant financial resources for the startup investment market. Thus, the venture capital fund in Vietnam is an important intermediary with venture capital tools to help form and develop startup ideas as well as promote innovation activities.

## **4.2. Discussion**

### **4.2.1. Challenges**

Firstly, regarding the legal corridor, there are currently no legal documents directly referring to the form of venture capital, but only a few regulations related to this activity. The Enterprise Law already stipulates that



members of a limited partnership can only be individuals. Meanwhile, according to other countries, capital contributors are mostly organizations such as banks, pension funds, research institutes, universities, etc. and partners can also be fund management companies. Therefore, there is no appropriate legal regulation for the venture capital fund to operate in Vietnam in the form of a limited partnership company.

Second, the protection of intellectual property rights in Vietnam still has many shortcomings. Infringement of intellectual property rights and counterfeit goods are rampant. In particular, the most alarming is in the field of software - one of the potential areas to attract the attention of investors.

Third, the business environment in Vietnam currently does not encourage transparency in business activities and is “snappy”. The tax regulations are not clear and the income tax rate is quite high, forcing many domestic enterprises to follow a non-transparent accounting regime.

Fourth, Vietnam’s high-tech industries are currently in the launching stage, especially compared to other countries. This industry is currently facing many difficulties in the process of competing with other countries in terms of human resources, grasping and accessing markets.

Fifth, the Vietnamese human resources suitable for the development of venture capital investment are currently not available. It is quite a new and unpopular term in Vietnam, so human resources knowledge and having the necessary skills for this type of business are limited.

#### **4.2.2. Opportunities**

Firstly, the stock market in Vietnam officially came into operation in July 2000. So far, although it has not played a big role in mobilizing capital in the economy, its initial steps have promised to create a potential capital withdrawal channel for the venture capital funds in the near future.

Second, the private business sector and entrepreneur spirit are encouraged and growing stronger. One of the important milestones was the introduction of the Enterprise Law in 2000, which cleared legal barriers for the private sector, created a favorable legal environment and increased the number of non-state enterprises in Vietnam. In addition, many guidelines, policies and measures from the Government to encourage and support the development of the private sector have clearly demonstrated its commitment to the development of this sector, thereby encouraging entrepreneurship among the population and promising attractive projects for the venture capitalists.

Third, Vietnam’s economy in recent years has witnessed a high and stable growth rate in the region. A stable, high-growth economy promises a good market for business activities.

#### **4.2.3. Solutions**

(1) Support from the Government in promoting the attraction of venture capital and venture capital activities.

Firstly, the preferential mechanism for angel investors and venture funds in Vietnam. These issues are up to now unclear and lack legal frameworks. In order to attract attention to domestic and foreign investors, the Government can actively invest in the venture capital fund.

Second, the capital degradation mechanism is more favorable for investors. Notably, strict foreign exchange management has caused difficulties in receiving investment capital and divesting capital.

Third, building the startup ecosystem as soon as possible and the ecosystem to create capital for startups is extremely important. There should be studies on angel investment funds, venture capital funds and creating incentive mechanisms to help startups always have capital ready to operate.

(2) Increasing the provision of information and disseminating knowledge.

To improve the community's understanding of entrepreneurship, venture capital and its investment, it is necessary to: Inspire, share and devote the knowledge from experts through the formation and operation of classes, workshops and seminars and in all provinces and cities. Enhance the creation of more favorable conditions for organizations to support start-up activities, especially non-profit organizations. Strengthening the dissemination of information on national television and newspapers.

(3) Promoting and improving the quality of venture capital activities in Vietnam.

Firstly, extending the connection with foreign investors or those abroad. Most of the venture capital funds with large capital and experience are located in foreign countries, therefore, innovative start-ups need to have the right orientation towards innovations that the whole world can apply.

Second, it is urgent to improve the quality of venture capital activities in the country, increase the number and expand the technology incubators, especially those with support from foreign entities. The incubator has a strong connection between those who need capital and those who have excess capital, which is an effective service model for start-ups, attracting venture capital and its investment.

Third, it is important to limit monopolies and create a healthy competitive business environment.

(4) Developing human resources for startups and venture capital in Vietnam

*\* For students at schools and universities/colleges*

Starting up should be considered as a support and career-oriented activity for students from the second year onwards. It is necessary to form a training network for lecturers at the national level and support them to participate in planned, thematic and certified training courses; at the same time, the startup system needs to soon form a website and connect with each other to provide databases and information of training institutions, lecturer system and various start-up programs/training courses to meet the online training needs of learners and students. In addition, focusing on connecting resources between universities, experts, investors or large enterprises to support, accompany a number of start-up projects and towards future success to promote the company and other partners.

*\* For individuals, business organizations*

Individuals and organizations need to improve their creative capacity by participating in startup ecosystems, technology incubators, actively learning directly from seminars, workshops, events on startup activities and innovation at home or abroad or participating in competitions related to innovation, creativity or startup or even reality TV shows about startups and raising capital from investors in order to have experience, connect and promote their achievements more effectively. In addition to ideas, individuals and businesses improve their knowledge of management, finance, accounting and foreign languages through classes or online courses for their solid development.

## 5. CONCLUSIONS

Startup activities in Vietnam are growing and getting more attention, so the potential to attract venture capital and develop venture capital activities is increasing. Through the results of this research, it is also possible to partially assess the current state of startup and venture capital investment at that time. The development of venture capital activities will provide an effective funding channel for start-ups in particular and the Vietnamese economy in general. Lessons from the experience of starting a business on venture capital activities from countries around the world will help Vietnam learn and shorten the time in the country's economic development roadmap. Although there are still many barriers such as legal issues, limited level of resources, more and more attention, recognition of problems, finding solutions and

innovation from the community and the Government are promising to witness a tremendous growth of startups and venture capital investment in the future.

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## DEVELOPING E-TAX IN VIETNAM

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*ABSTRACT: The development of e-tax is an inevitable trend in the digital economy. This paper systematizes theoretical issues on e-tax and its development, assesses the current state of e-tax development in Vietnam, through that, pointing out the achieved results and limitations in e-tax development in Vietnam; assess the current situation of factors affecting the development of e-tax in Vietnam. On that basis, this paper proposes solutions to promote the development of e-tax in Vietnam in the coming time.*

*Keywords: Development, E-taxation, Vietnam.*

### 1. INTRODUCTION

E-tax has its own distinctive features, is a constituent part of e-Government, developing along with the general development of e-Government, tax public services. E-tax is provided entirely on online platforms and it is a product of the industrial revolution 4.0.

Basically, e-tax provides a lot of utilities related to public tax services, but it can be generalized the basic functions such as: Account registration, e-tax declaration, e-tax payment, e-tax refund, e-invoices, business management, lookup, FAQs etc.

The e-tax system brings benefits not only to taxpayers, tax authorities but also to commercial banks and service providers related to e-tax. Thanks to e-tax, procedures are simplified, and human resources, time, travel costs and paperwork costs are saved.

Up to now, there have been many research works both at domestic and abroad in the subject of e-tax such as: The work “Electronic Tax Filing in the United States: An Analysis of Possible Success factors” summarized and analyzed the demographic, socio-economic and geographic factors affecting e-filing in the United States in 1999, and 2004–2007 and an increase in e-filing between 1999 and 2007. (Sonja E.Pippin and Mehmet S.Tosun, 2014). The study titled “Determinants of user acceptance of the e-Government services: The case of online tax filing and payment system” by Shin-Yuan, Hung Chia-Ming Chang and Ting-Jing Yu offers that in addition to the obvious academic value, the management implications of this study will also benefit government policymakers. Government agencies and system designers. (Shin-Yuan, HungChia-MingChang and Ting-JingYu, 2006). Scientific article “Strengthening the role of e-tax in e-government development in Vietnam: Current situation and recommendations” by Nguyen Thi Le Thuy - National Economics University. This paper analyzes the situation of e-government and e-tax in Vietnam, analyzes issues that need to be solved in e-tax implementation. The paper proposes 3 groups of solutions to strengthen the role of e-tax in e-Government development in Vietnam in the coming period. (Thuy, N. T. L. 2018)

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## 2. THEORETICAL FRAMEWORK

### 2.1. Criteria for assessing the development of e-taxation

E-tax development is developed in two main aspects: *expansion, increase in quantity* and *improve quality*. The increase in quantity is reflected in the increase in the number of users, the increase and diversification of the utilities of e-taxation, the increase in the types of tax procedures applied, the increase in the number of operational functions and tax administration operations are electronicized, the rapid increase in processing speed etc. The improvement in quality represents better and better satisfaction of the needs of e-tax users, both from the part of taxpayers and tax authorities. Only when e-tax develops comprehensively in all aspects and all the criteria mentioned above, will e-tax development really expand in scale (horizontally) and go into quality (in depth) towards more and more perfection at a higher and higher level. From the above concept, it can be seen that quantitative and qualitative criteria assessing the development of e-taxation are as follows:

**Quantitative indicators:** The rate of increase in the proportion of tax public services applying e-tax to the total number of tax public services; The rate of increase in the ratio of public service levels on e-tax to the total number of public services on e-tax; The rate of increase in the ratio of taxpayers using e-taxes to the total number of taxpayers; The speed of increase in the number of taxpayers using e-tax services for each specific type of tax procedure; The change in the processing time of electronic tax procedures.

**Qualitative criteria:** Taxpayer satisfaction when applying e-tax; utility of e-tax in tax administration of tax authorities; ability to preserve and secure the e-tax system.

### 2.2. Factors affecting the development of e-taxation

**Factors from tax authorities:** The Government's e-tax development policy; the quantity and quality of human resources of tax authorities; the scale and orientation of investment in e-tax development of tax authorities.

**Factors outside tax authorities:** Legal corridor for e-tax development; level of development of technological infrastructure of the economy; human resources for receiving and using e-tax; development of e-public services of relevant state agencies; coordination of relevant state agencies.

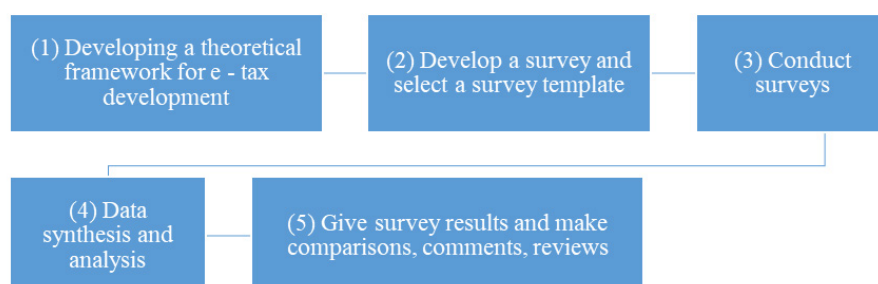
## 3. METHODOLOGY

*The author of this paper uses the following main research methods:* Using dialectical materialist methodologies, historical materialism, meta-analysis methods, statistical methods, comparative methods, evaluations, comments.

*Data collection method:* The topic using secondary data which is reported by the General Department of Taxation and official statistics of state agencies.

The author uses the questionnaire survey method to collect data on “The efficiency and quality of e-tax through the actual survey of taxpayers’ use when using the e-tax system provided by the domestic tax authority” with the research sequence according to the following model:

**Diagram 1: Survey methodology diagram**



**4. RESULTS AND DISCUSSION**

**4.1. Results**

**a) Current situation of e-tax development in Vietnam quantitatively**

- *Current status and growth rate in the proportion of tax public services applying e-tax to the total number of tax public services*

By the end of 2022, according to the report, the tax industry has actively deployed and provided online public service provision with 304 administrative procedures in the field of taxation with the rate of tax on tax public services applying e-tax to the total number of tax public services is very high and all at level 2 or higher. Meanwhile, the number of public services integrated into the National Public Service Portal also reached about 82.42%.

- *Current status and speed of increase in the ratio of public service levels on e-tax to the total number of public services on e-tax;*

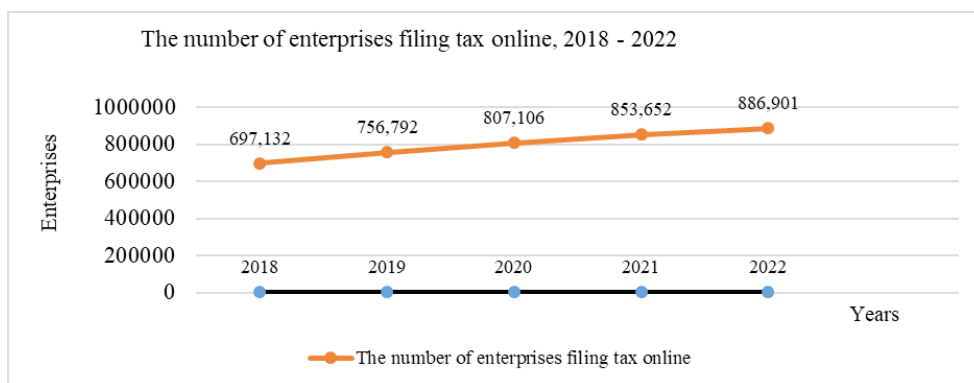
In 2022, based on the Decision to announce administrative procedures, the General Department of Taxation has completed the deployment of 103/234 online public services level 3 and 4 and integrated 97/103 online public services level 3 and level 4 to the National Public Service Portal.

- *The current situation of the increase in the proportion of taxpayers using e-tax compared to the total number of taxpayers*

By the end of October 2022, according to statistics, the General Department of Taxation had received 1,939 first-time tax registration applications and 1,832 applications for changing tax registration information of individuals who do not do business through the National Public Service Portal. In addition, in terms of deploying e-Tax Mobile service, by May 4, 2022, there have been 129.4 thousand downloads and installed, used the e-Tax Mobile application, 45,866 accounts registered for transactions. In addition, immediately after the launch of the Portal for Foreign Suppliers, by 2022, 38 foreign suppliers had successfully registered and declared taxes.

- *The current situation of the increase of taxpayers using e-tax services for each specific type of tax procedure*

- *E-filing*



**Figure 2: The chart shows the number of enterprises filing tax online, 2018 – 2022**

(Source: the NEAC and figures from the Ministry of Finance)

In the period of 2018 – 2022, the number of businesses filing taxes online is increasing and has a fairly fast speed. From 2018 to 2022, the number of businesses filling online tax declaration increased by 189,769 businesses, or 1.27 times (increased to 127%).

- *Electronic tax payment***Table 3: Statistics table on e-tax payment in the period 2018-2022**

(Source: Annual Report - Ministry of Finance)

Target	2018	2019	2020	2021	2022
Electronic tax payment transaction number (Transaction)	3,100,000	3,236,477	3,224,392	3,123,854	3,346,667
Proceeds from electronic tax payment	VND 656,824 billion	VND 654,516 billion and USD 23,669,146	732,858 billion VND and 36,683,130 USD	VND 731,872 billion and USD 40,356,595	VND 765,817 billion and USD 55,853,591

The table above shows that, in the period from 2018 to 2022, the number of e-tax payment transactions and the amount collected through e-tax payment increased steadily over the years.

- *E-tax refund*

The State has strengthened tax administration, strictly and thoroughly controlled VAT refund payments, improved the efficiency of tax refunds, and facilitated capital turnover for enterprises.

**Table 4: Statistics of e-tax refund in 2018-2022**

(Source: Annual Report - Ministry of Finance)

Target	2018	2019	2020	2021	2022
Number of enterprises applying for electronic tax refund (Enterprise)	7,340	8,424	8,915	8,856	7,938

- *E-invoices*

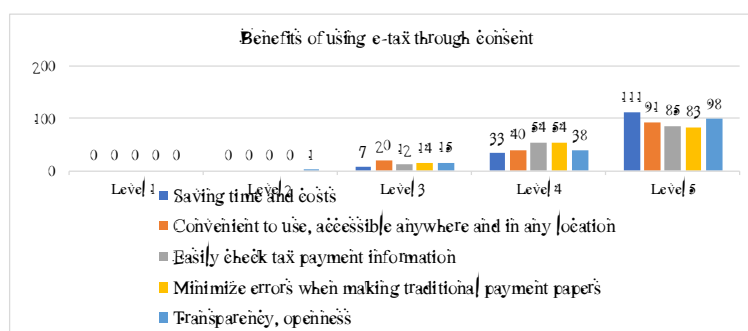
The whole tax industry has successfully implemented e-invoices in accordance with the provisions of the Law on Tax Administration No. 38/2019/QH14. Accordingly, except for special cases where printing invoices of tax authorities are used, from 01/7/2022, all organizations, businesses and individuals using invoices nationwide have registered to convert to using electronic invoices. As of the end of 2022, there had been more than 2.1 billion e-invoices issued.

- **Current situation of changes in the processing time of e-tax procedures**

Most e-tax procedures are processed within 24 hours of receiving the request, this time is much faster than e-taxes in the past and is a great level of disruption compared to the time when working with traditional tax procedures when it did not consume printing time press, travel, search for information.

**b) The current situation of e-tax development in Vietnam in qualitative terms**

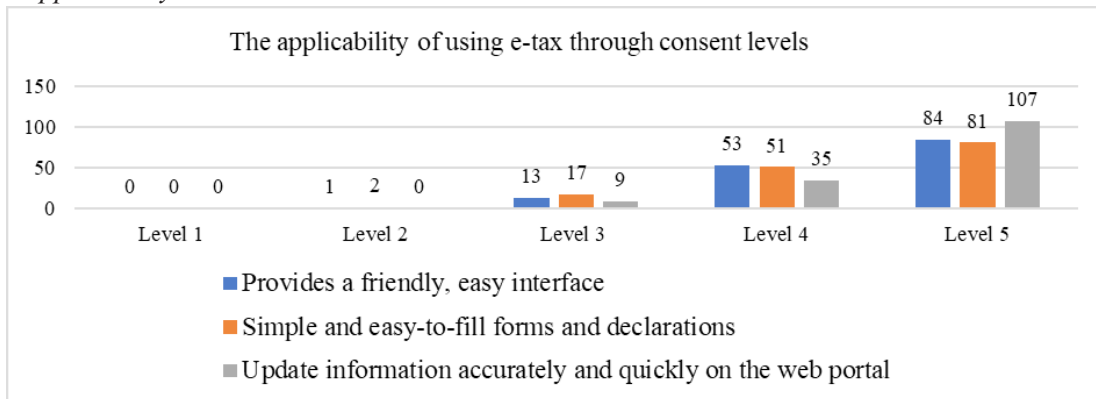
- **Current status of taxpayer satisfaction when applying e-tax**

- *Efficiency***Figure 5: Chart showing benefits of using e-tax through consent levels**

(Data: Survey results of the topic author)

From the chart, we see that level 5 (Totally agree) chosen by the majority of survey participants shows the effectiveness and convenience of using the electronic tax system.

- *Applicability*

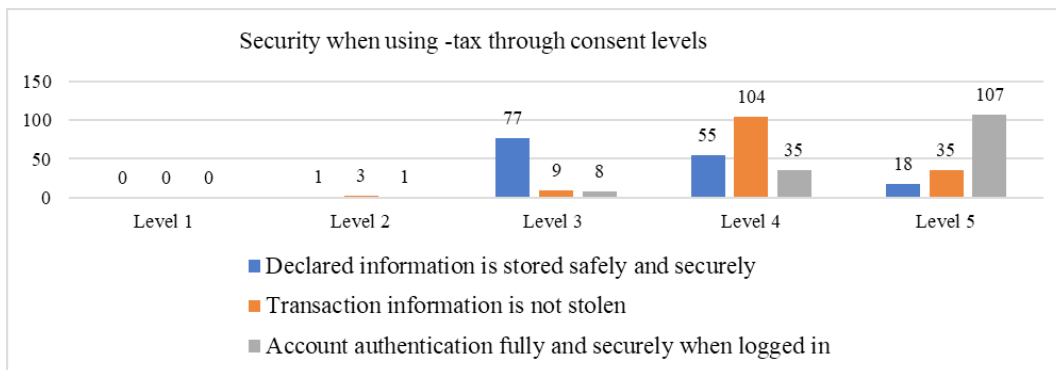


**Figure 6: Chart showing the applicability of using e-tax through consent levels**

(Data: Survey results of the topic author)

From the chart, we see that level 5 (Strongly agreed) chosen by the majority of survey participants shows the applicability of the e-tax system through 3 criteria.

- *Security*



**Figure 7: Chart showing security when using e-tax through consent levels**

(Data: Survey results of the topic author)

Through statistics and data analysis, the majority of survey participants agree on the criteria that information is stored safely and securely at level 3 (Normal) and level 4 (Agree); in which, the majority of survey participants chose level 4 (Agree) with the criterion that information is not stolen and level 5 (Completely agree) with the criteria of authenticating the account when logging in fully and securely.

- *Transmission line*

Level	Level 1	Level 2	Level 3	Level 4	Level 5
Number of people	27	80	18	21	5
Proportion (%)	17.9%	53%	11.9%	13.9%	3.3%

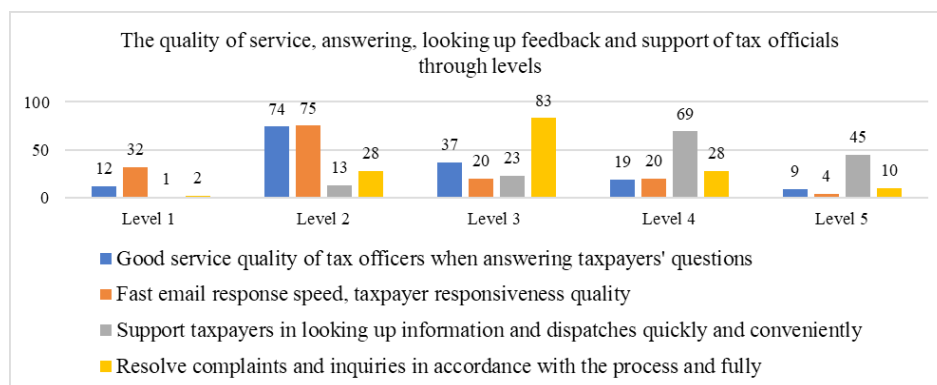
**Table 8: Table showing agreement on transmission lines when using e-tax through the following levels**

(Data: Survey results of the topic author)

From the chart, we see that level 2 (Disagree) is chosen by the majority of survey participants for the criterion of stable transmission with little interruption.

- *Lookup, Q&A, feedback, business support*





**Figure 9: The chart shows the quality of service, answering, looking up feedback and support of tax officials through levels**

(Data: Survey results of the topic author)

Through statistics and data analysis, the majority of survey participants agree on the following criteria:

- The quality of service of tax officers when answering taxpayers' questions is good: The majority of respondents agreed at level 2 (Disagree).

- Fast email response speed, taxpayer response quality: Majority of respondents agree at level 2 (Disagree).

- Support taxpayers in looking up information and dispatches quickly and conveniently: The majority of respondents agreed at level 3 (Normal).

- Resolve complaints and questions in accordance with the process and fully: The majority of respondents agreed at level 4 (Agree).

- ***Current status of utility of e-tax in tax administration of tax authorities***

Currently, the basic electronic tax system has met the following utilities in tax administration of tax authorities such as: Collection, statistics, synthesis, information and data of taxpayers; Processing documents submitted by taxpayers through the Web Portal; Collate, check data, review data in cases of professional re-examination, tax refund, inspection and inspection; Information storage, data management; Report, summarize; Control of tax-related operations of enterprises.

- ***Current status, security and preservation of the e-tax system***

- Regarding ensuring data sources and electronic information: The tax industry orients to partition the server system according to basic functional groups, apply methods to enhance backup to many different places to limit risks, use a decentralized user resource management system, Apply informatics antivirus system on all server systems, networked computers and single machines with regularly updated antivirus software from the providers.

- On the side of transaction and taxpayer account security: The accounts provided to taxpayers are secured through login passwords, transaction PINs and digital identifiers for taxpayers. There are legal provisions on specific responsibilities for enterprises participating in providing T-VAN services in information security.

**c) Assessing the current situation of factors affecting the development of e-tax**

- ***Factors from the tax authorities***

- *The Government's e-tax development policy*

The Government has instructed state agencies to implement the policy of e-government and digital government. Since then, the tax sector has concretized into action programs to develop e-tax with practical activities such as: Scaling up the model of smart operation centers; programs to encourage people to

use electronic invoices such as: “Lucky invoice” of the General Department of Taxation directed to tax departments of 63 provinces and cities to report to competent authorities to organize; commend individuals, organizations and enterprises for fulfilling tax obligations, especially using e-tax platforms...

*- The quantity and quality of human resources of tax authorities*

+ In terms of quantity: Compared to 2015, in 2022, payroll has decreased by 16.8%. In the 5 years from 2016 to 2022, the number of payrolls decreased by 9,696 people (i.e. 22.72% of the payroll assigned by the General Department of Taxation in 2016), this number included retirees, quitters and downsizing. Implementation of Decision No. 520/Decision-Ministry of Finance dated 13/4/2018 of the Ministry of Finance on approving the plan to arrange and merge Tax Departments of districts, towns and cities into Regional Tax Departments under the Tax Department of provinces and centrally-run cities. From the end of 2018 to 2020, the tax department arranged and consolidated 565 tax departments to establish 267 regional tax departments, reducing 296 tax departments. Accordingly, the number of tax departments in the country have been cut from 711 to 415.

+ In terms of quality: Tax officers are now fully equipped with skills and skills, meeting standards for people’s development as well as operating the e-tax system; The leadership department has improved management ability, spirit and responsibility to work. However, the situation reflects, a part of tax officers is still not really equal in capacity and ethics.

*- Scale and orientation of investment in e-tax development of tax authorities*

The tax authorities have been focusing on investment orientation to develop e-tax comprehensively not only in quantity but also in quality, focusing on investing in the main human factor - taking taxpayers as the center of development. The General Department of Taxation has oriented investment in the development of e-tax in the direction of digital transformation: (1) Reforming of synchronous administrative procedures through the application of Information Technology; (2) Developing and implement an integrated and centralized tax management system; (3) Building a data platform for tax administration and smart tax services; (4) Deploying technical infrastructure to ensure safety and security for IT systems in the tax industry in the direction of digital transformation.

• ***Factors outside the tax authority***

*- Legal corridor for e-tax development*

In the period of 2018-2022, on the basis of existing laws in the past along with actual monitoring of issues surrounding e-taxation, the National Assembly, the Government and other competent agencies have promptly promulgated new and amended and supplemented legal documents as a foundation for e-tax development.

*- The level of technological infrastructure development of the economy*

According to statistics of the Vietnam Internet Center, as of the beginning of 2021, Vietnam currently has 68.72 million Internet users, accounting for 70.3% of the total population, Vietnam’s Internet speed and ranking have both increased (Vietnam Internet Center, 2021). Since the start of the COVID-19 pandemic until the first 6 months of 2021, Vietnam has added about 8 million new digital consumers, 55% of whom are from non-urban areas (Google, Temasel and Bain & Company, 2021).

Equipment serving the administration of the e-tax system of State agencies and at the same time meeting the standards of use of taxpayers. Basically, State agencies as well as organizations and enterprises have equipped relatively modern computers, electrical systems, and network transmission equipment for

using and working on the e-tax platform. For enterprises, the use of e-invoices requires the unit to have a certain level of technical infrastructure in information technology, along with the qualifications and capacity of relevant individuals and departments.

*- Human resources receive and use e-taxes*

Currently, in large enterprises and organizations, there is a separate department that handles direct tax jobs and operations with high qualifications, flexible working, proficiency in information technology, adaptation to policies, agile information sources and constantly learning, self developed in order to meet the pace of e-taxation. However, there have been still less developed areas such as those in rural, mountainous and island areas where taxpayers are far to meet the demand of e-tax. In these areas, human resources to develop e-tax of enterprises are not good enough for e-tax application.

*- The development of e-public services by relevant state agencies*

The current e-tax system in Vietnam has links with other public administrative services of relevant state agencies serving organizations and enterprises to provide information on administrative procedures and related public services, helping citizens to be convenient, enterprises access online public services and support information queries.

*- The coordination of relevant state agencies*

The coordination between tax authorities and other relevant state agencies is also an important factor to develop e-tax, currently the tax sector mainly coordinates with units: Ministry of Information and Communications, Ministry of Science and Technology, Ministry of Public Security - Department of Security and Prevention, fight crime using high technology. In addition, the Tax Department with the coordination of many other departments such as the Propaganda Department, the Fatherland Front,.. has greatly supported the overall development of e-taxation.

## **4.2. Discussion**

### **4.2.1. Advantages in the development of e-tax in Vietnam**

*- Comprehensively reforming the e-tax system*, deploying the use of e-tax services has **grown strongly in number**. The Ministry of Finance officially closed two old platforms, iHTKK and e-tax declaration, launched the e-Tax Mobile application and the Web Portal for foreign suppliers; Promptly amend and reform to bring a close, easy-to-use experience, integrating many functions and the smoothness and stability of the e-tax system with higher information security, bringing a comprehensive and convenient system for both users and managers. The e-tax system is implemented in 63/63 provinces and cities; covering up to 100% of tax departments deploying, expanding the scale and approaching almost the absolute number of operating businesses.

- Having built and perfected the legal system to **create a solid legal foundation**, recognizing the legality of e-tax; supplementing, amending and issuing new circulars and decrees, in order to resolve outstanding contradictions in the laws, guide people to follow legal documents and officials to handle situations, work in certain cases.

*- Service providers on online platforms* to tax payers have participated more and more so far: Seizing the development opportunities in the digital economy, business units of e-tax-related services have increased dramatically in number. If only at the beginning of 2018, there were about 40 commercial banks participating in the e-tax collection service, by 2022, there had been 55 commercial banks participating in this activity. The service quality of banks is increasingly fast, convenient, easy to transact anytime, anywhere, not only

that, but also supports the provision of other services for businesses registered with dense transaction offices to support taxpayers in the most convenient and fastest way. Not only that, the General Department of Taxation also have approved 8 units providing T-VAN services as value-added services for electronic transactions in the field of taxation and approved 17 units providing digital signatures.

#### **4.2.2. Limitations in the development of e-tax in Vietnam**

- Although it has grown quite strongly in quantity, e-taxes **have not met practical requirements for scale and diversity**. There are still many tax procedures and stages that have not been electronicized, and many types of tax professional jobs both use electronic systems and paper document systems.

- **The quality of** e-tax services is still **not high**. When taxpayers encounter problems, in addition to the most common and common problems answered directly by the General Department of Taxation on the Portal, there are still many difficulties in contacting to receive direct assistance from tax officials in special cases, as a result, taxpayers have to go directly to the tax office to work with tax officials. In addition, the quality of services working with tax officers when supporting the use of the e-tax system has not received the satisfaction of the people when there are negatives in the quality of service, ethics and lifestyle of the staff are still reflected a lot.

- **Information security** remains a concern of authorities and users. Currently, it is not possible to claim with complete certainty that taxpayers' own information, transaction activities, electronic invoices etc. will be absolutely safe. In case the tax system is attacked or terrorized, it is easy for the above information to leak to the outside. This causes enormous damage to taxpayers as well as the reputation of the e-tax system.

- Uneven and **weak facilities and technological infrastructure**. In mountainous and island areas, it is still difficult to access the internet, not to mention that the equipment for accessing and working on the e-tax system still has many limitations or even in developed areas, congestion and collapse of transmission lines still often occur, causing access disruption, working and transacting on the electronic tax system. The young and weak information technology system has led to worrying gaps and along with that, the efficiency of e-tax has not been optimal.

- **Intermediate costs** when using electronic taxes have been on the trend of **increasing**. In addition to fixed expenses for Information Technology, machinery, software costs, periodic maintenance, repairs or upgrade costs; Taxpayers have to pay additional costs to the digital signature management unit or in case of paying taxes through banks, fees may be charged. According to calculations with the money transfer fee in the current Vietnamese banking system, if an enterprise pays a tax of VND 10 billion, when paying tax electronically, the enterprise will spend an additional VND 3-4 million in fees to the bank while if paying in cash, there is no cost for this cost.

- **Adequate investment has not been made in the development of human resources and facilities**. Old facilities, not enough basic office materials such as printers, computers,... for employees is a problem of small businesses, small business households, not to mention the shortage of high-quality labor to work professionally in the field of taxation is also because financial and human resources are weak, not enough to invest to serve tax operations.

## **5. CONCLUSION**

This period of 2023-2030 will be a golden time for Vietnam's e-tax to continue inheriting the foundation of the 2018-2022 period and at the same time develop strongly, bringing the e-tax system to develop more comprehensively. In order to keep up with development needs, we need to set specific goals and roadmaps so that future steps can achieve successes and minimize risks encountered on the path of e-tax development

in Vietnam. Here, the author proposes solutions to overcome the backlog limitation and help promote the development of e-tax in Vietnam in the coming time as follows:

- **Complete a uniform legal corridor in** a timely manner, in line with the actual development of e-taxation in the process of reforming tax administration institutions and reforming the organization of the tax sector. Laws and institutions need to be constantly upgraded, amended, supplemented and perfected for the purpose of improving tax administration productivity while promoting voluntary compliance with the law and limiting legal risks, which is also the desire for results achieved when offering this solution: (1) Continuing to improve the laws and legal documents revolving around the field of e-taxation; (2) Simplifying the administrative procedures; (3) Continuing to improve the organizational model of tax authorities at all levels in the direction of streamlining; (4) Resolving conflicts between laws; (5) Amending and supplementing the documents detailing and guiding the implementation of the law to promptly handle current problems in the process of using e-tax; (6) Perfecting the regulations on e-invoices, e-invoices with authentication codes of tax authorities.

- **Upgrade facilities and technology infrastructure.** *Firstly*, increase the State's investment in offices and procurement of assets for tax authorities' operations, meet the requirements of modernizing the working environment of the tax sector, develop home and remote working systems for tax officials. Governments should propose investment from countries around the world through official development assistance funds and cooperate in technology exchange. *Second*, favorable conditions for technology enterprises to develop for the e-tax system should be created. *Third*, specific investment policies for disadvantaged areas such as rural, mountainous and island areas should be implemented. The Government should invest in equipment concentration areas such as installing computer systems in cultural houses of villages, villages and communes so that people gradually have access to technological equipment, consider installing mobile broadcasting systems and providing mobile networks in Vietnam.

- **Strengthen propaganda, encouragement and support for taxpayers to use e-taxes.** *Firstly*, programs to encourage people to use e-tax with service cost incentives, lucky draw programs, praising typical taxpayers in converting the use of e-tax, setting emulation targets among businesses to improve morale, responsibility for the use of electronic taxes should be conducted. *Secondly*, the tax authorities should implement programs to answer and support taxpayers online via the website of tax authorities (system of 479 information channels to support taxpayers), support taxpayers according to taxpayer subgroups and fields of operation arising from tax obligations, provide automatic information (artificial intelligence-AI, Chabot) for a number of topics/contents that the majority of taxpayers are interested in and need support, continue to maintain other forms to support taxpayers in areas and groups of taxpayers with limitations in using information technology applications. *Third*, depending on the access area, there are different communication options with the goal of disseminating e-tax and increasing people's trust in e-tax in the country through media, meetings and training. More tax law propaganda programs through multimedia channels, organize programs should be organized to increase people's understanding of e-tax in various forms from theoretical tests to the application in reality.

- **Solutions to improve the quality of human resources to meet the requirements of e-tax development**

*First*, the quality of human resources of tax authorities should be improved including: Renovating the recruitment of civil servants, promoting the training and fostering of in-depth knowledge and skills according to each tax administration function in order to meet the requirements of modern tax administration, building professional style, especially clean thinking and practice ethics. *Second*, the quality of human resources for taxpayers should be improved. Organizations and businesses should have policies to attract talents

such as: salary increase, bonus for excellent employees with advanced degrees; building a healthy working environment, healthy competition, investing in professional skills development for employees; encourage employees to actively learn, improve personal skills. **Third**, solutions to develop human resources in disadvantaged areas such as rural, mountainous and island areas should be implemented. High quality tax officers should be arranged to organize direct training, disseminate new policies, information as well as specific instructions on the use of e-tax. Well-trained and skilled tax officers should be attracted to work in this area to work with many opportunities such as: experiencing a new environment, improving promotion opportunities, enjoying special compensation regimes,...

**- Continue to improve, upgrade and modernize the e-tax system**

**First**, the e-tax system in Vietnam should be improved in a way that is integrated, simple and modern; highly consistent with the e-Government in general. **Second**, database of user information for search and management should be built; the automatic tax management information connection should be applied. **Third**, the application software systems, information technology systems of the tax industry should be built and improved. **Fourth**, the information protection barriers and confidentiality of the e-tax system should be strengthened. In terms of technical infrastructure, regular operation of the e-tax technical infrastructure system and transform and deploy the information technology infrastructure of the tax industry operating on cloud computing in the direction of providing platform-level services should be maintained. Regarding the information security system, the information security system for the deployment of existing applications of the tax industry should be maintained. Smart information security with the application of new technologies solutions should be soon applied. **Fifth**, a plan to maintain and upgrade the system to avoid interruptions to user access should be applied. **Sixth**, the e-tax improvement process with the proposed roadmap should be planned as follows: (1) Identifying inadequacies in e-tax. (2) Defining goals. (3) Selecting options to solve the problem of inadequacies. (4) Assessing the impact of the alternatives. (5) Collecting feedback. (6) Continuing, apply the new method into practice and rotate the assessment.

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## FINANCIAL POLICIES TO PROMOTE THE DEVELOPMENT OF THE LOGISTICS INDUSTRY

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**ABSTRACT:** *This research presents and analyzes the specific financial policies that Vietnam has implemented to promote the development of the logistics industry, including fiscal policies, credit policies, insurance policies, and tax policies. Additionally, through the use of analytical methods such as comparative statistical analysis and synthesis, the study also addresses the benefits and challenges of these policies, providing recommendations to improve the effectiveness of financial policies in supporting the development of the logistics industry. The research results will provide a comprehensive understanding of the relationship between financial policies and the logistics industry, while contributing to shaping future policies in this field.*

**Keywords:** *financial policies, logistics industry development*

### 1. INTRODUCTION

Financial policies encompass a set of decisions and actions implemented by governments or financial institutions to manage the financial resources of a country or organization. Financial policies have significant impacts on the economy and society, including economic growth, employment, prices, income, health, and education. Financial policies often involve tax regulation, public expenditure, public debt management, and financial market regulation. Choosing appropriate financial policies requires in-depth knowledge of the economy and financial issues, along with careful assessment of their impacts on the economy and society. Currently, Vietnam is considered to have many opportunities to promote the development of the logistics services sector. Therefore, the development of logistics services in Vietnam requires appropriate financial policies to meet the requirements of current rapid integration and development trends. By understanding the impacts of financial policies and proposing suitable policies, the government and relevant agencies can create favorable conditions for the development of the logistics industry, while supporting economic growth and improving the country's competitive position in this field.

### 2. OVERVIEW OF THE RESEARCH

Numerous empirical studies have been conducted to examine all aspects of logistics activities, including supply chain management, transportation management, warehouse management, human resource management, and financial management. Some notable studies include “The Effect of Financial Policies on the Logistics Sector of Nigeria” (2021) by Michael Chijioke Ugochukwu and Nwachukwu Prince Olumide; “The Impact of Financial Policies on Logistics Service Providers in the European Union” (2019) by Mihaela-Simona Suba. Other studies include “Application of Financial Policies in the Development of Logistics Services in Vietnam” (2019) by Nguyen Thi Lan Huong, and “Financial Policies and their Impacts on Logistics Activities in Vietnam” (2020) by Nguyen Thi Minh Phuong and Dao Xuan Thanh.

However, these works were carried out in specific economic, cultural, political, and institutional environments during the respective research periods. Due to the lack of uniformity in the environment and historical context across different countries and historical periods, it is challenging to achieve a consistent understanding. Moreover,

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there are differences in political systems, cultures, economies, and educational levels, so the authors believe that studying financial policies for logistics development in a specific country, during a specific period, is necessary to align with the characteristics of each country in its respective era. Theoretical issues related to financial policies for logistics development need to be further developed and refined to align with practical situations. Therefore, continuous research and proposals of specific solutions with tangible results are required.

### **3. RESEARCH METHOD AND CONTENT**

#### **3.1. Research method**

This study employs the dialectical materialist approach, synthesis method, statistical and comparative method, and analytical method.

#### **3.2. Research Content**

In recent times, the Vietnamese government has implemented various financial policies to develop the logistics industry in Vietnam. Specifically, these policies include:

*Firstly, the state budget expenditure policy.* The investment in infrastructure construction is carried out in accordance with the resolutions of the National Assembly, aligning with the set objectives and orientations. It addresses the capital needs for infrastructure development, contributes significantly to the construction and upgrade of a synchronized, standardized, modern, and nationally and internationally connected infrastructure system. It also enhances the capacity of state assets and infrastructure to provide public services, ensures national energy security, and improves urban infrastructure, especially in major cities. These efforts aim to better meet the demands of socio-economic development with higher quality services and more favorable accessibility, thus creating a foundation to drive the development of the logistics sector.

In addition, the government has shown interest in and implemented policies to enhance the competitive capacity of the logistics industry through multiple support channels. These include developing training programs and enhancing the skills of logistics personnel, creating favorable conditions for universities, colleges, and vocational schools to offer logistics specialization programs, providing financial support for logistics workforce training, promoting cooperation between businesses and educational institutions, and establishing supportive policies for human resource development.

*Secondly, credit policies.* In order to support capital for the logistics industry in Vietnam, the Government has implemented credit policies, including providing loan packages with preferential or zero interest rates, sponsorship from government development support programs, and credit guarantees.

*Thirdly, credit policies.* In order to support capital for the logistics industry in Vietnam, the Government has implemented credit policies, including providing loan packages with preferential or zero interest rates, sponsoring from government development support programs, and credit guarantees.

*Fourthly, tax policies.* According to current regulations, imported goods are subject to import taxes based on the classification of goods. Goods such as machinery, equipment, vehicle parts, and production materials in the logistics industry still have to bear high import taxes, which increase the production costs and competitiveness of logistics enterprises. Imported goods used in logistics activities in Vietnam are subject to import taxes according to legal provisions. However, logistics enterprises may be exempted from import taxes for equipment, machinery, transportation vehicles, and tools used in their operations. Currently, logistics services fall under the category of commercial services and are subject to a 10% value-added tax (VAT). However, implementing this tax requires a clear distinction between logistics services and other business activities.

### **4. RESULTS AND DISCUSSION**

#### **4.1. Results of the Financial Policy's Impact on the Development of the Logistics Industry in Vietnam**

*Firstly, the government has paid attention to improving the legal framework for financial policies in the logistics sector*



The Prime Minister issued Decision No. 200/QĐ-TTg on February 14, 2017, approving the Action Plan to enhance the competitiveness and development of the logistics service industry in Vietnam until 2025. This plan sets out six objectives, 60 specific tasks, and comprehensive solutions to help the industry overcome difficulties and challenges, achieve advanced levels within the region and the world, and meet the country's economic development requirements.

*Secondly, the financial policies have had a positive impact on the revenue growth of logistics service providers*

According to the Vietnam Logistics Business Association, the logistics industry in Vietnam has been growing at a rate of about 14% - 16% in recent years, with a scale of 20 - 22 billion USD per year, accounting for nearly 20.9% of the country's GDP. The total revenue of the logistics industry in Vietnam has significantly increased in recent years. Specifically, the revenue increased from around 20 billion USD in 2015 to over 40 billion USD in 2019. Among them, freight transportation services account for the largest proportion, representing about 40% of the total revenue of the logistics industry.

*Thirdly, the financial policies have contributed to strong improvements in logistics infrastructure*

Vietnam has made strong investments in improving transportation infrastructure to enhance the capacity of goods transportation. The North-South Expressway and the high-speed railway from Ho Chi Minh City to Hanoi have been initiated, constructed, and completed in recent years. In addition, ports and airports in Vietnam have also been upgraded, expanded, and invested in. This has made freight transportation faster and more efficient.

*Fourthly, financial policies have emphasized investment in technology to promote the development of the logistics industry in Vietnam*

Investment in technology has been one of the important factors contributing to the development of the logistics industry in Vietnam in recent years. New technologies applied in the logistics industry aim to enhance efficiency, reduce costs, improve warehouse management, order management, and shipment tracking. These technologies include IoT (Internet of Things), Blockchain, AI (Artificial Intelligence), and robotic assistance.

*Fifthly, there has been an increase in international cooperation*

Vietnam has signed many free trade agreements with countries around the world, creating favorable conditions for the development of the logistics industry in Vietnam. This helps Vietnamese logistics companies easily access international markets and expand their businesses. These agreements include the ASEAN Smart Logistics Network and cooperation with international logistics companies and trade agreements.

#### **4.2. Discussion**

The logistics industry is currently one of the rapidly developing sectors in Vietnam. However, the promotion of its development still faces many limitations from the country's financial policies. Below are some constraints of the financial policies in promoting the development of the logistics industry in Vietnam in recent years.

*Firstly, the state budget expenditure policy*

- Restrictions on finance and investment: The financial and investment policies have not been optimized to support the development of logistics businesses.
- Limitations on legal regulations: The regulations regarding logistics are not comprehensive, clear, and consistent among ministries, sectors, and localities, making it difficult to implement logistics services. Registering and obtaining operating licenses in the logistics industry in Vietnam require businesses to meet

strict requirements regarding customs regulations, taxes, and labor laws. The collection of logistics service fees in Vietnam is also challenging due to unclear regulations on pricing and taxes. Some companies may charge higher service fees than others, leading to unfair competition. The lack of coordination among management agencies and the lack of cooperation between ministries and sectors in making financial support policies for the logistics industry still exist.

- State budget expenditure policies for training, technology investment, and transportation infrastructure are limited. There is insufficient close cooperation among relevant ministries, sectors, businesses, and training institutions to address issues related to finance, legal matters, human resources, infrastructure, and technology in the logistics industry.

*Secondly, concerning tax policies.* The awareness of the importance of the logistics industry is slower compared to practical demands, resulting in delayed and inadequate incentive policies. The tax incentive policies have not fully calculated the comparative advantages of Vietnam to encourage businesses to participate in global supply chains effectively. The tax incentives for logistics companies have not sufficiently considered the business environment and scale of Vietnamese companies. The enforcement of tax incentive policies is quite complex and involves multiple administrative procedures.

*Thirdly, regarding credit policies.* There are limitations in accessing loan capital from credit institutions and difficulties in implementing lending. The fulfillment of guarantee obligations is slow and faces many obstacles. Many cases involve banks being denied by guaranteeing organizations to fulfill their guarantee obligations. Due to the characteristics of logistics services and the low starting point of Vietnamese businesses, such as insufficient assets for collateral, financially infeasible financial statements due to excessive initial investments, and difficulties in persuading credit institutions with loan applications, logistics companies face significant challenges in accessing credit sources.

*Fourthly, insurance policies.* Vietnam still lacks product diversification in insurance, and insurance policies are lacking transparency and uniformity in insuring transportation vehicles, cargo, liability, and personnel. This creates difficulties for logistics businesses.

## **5. CONCLUSION AND PROPOSED SOLUTIONS**

### **5.1. Conclusion**

The development of logistics in Vietnam has many advantages, such as its strategic position in the Asian region, a large consumer market, and the growing trend of e-commerce. However, to turn this potential into reality, a comprehensive development policy is needed, from attracting investment to improving infrastructure and administrative procedures. The role of financial policies in the development of logistics in Vietnam in the coming time cannot be denied. Therefore, multiple synchronized solutions need to be implemented, with financial solutions playing an important role. Some solutions to improve financial policies for the development of the logistics industry include state budget expenditure policies, credit policies, tax policies, and insurance policies. Additionally, coordination among relevant authorities and agencies is necessary to ensure the effectiveness of financial policies.

### **5.2. Proposed solutions**

*Firstly,* to improve the state budget expenditure policies: Invest in logistics infrastructure by constructing and upgrading transportation infrastructure, port and airport infrastructure, railway infrastructure, inland waterway infrastructure, and logistics centers; Enhance the efficiency of managing and utilizing state budget funds by implementing supportive policies for enterprises operating in the logistics sector and improving the effectiveness of managing and supervising the use of state budget funds in the logistics field; Promote the development of logistics enterprises by encouraging cooperation in training between businesses and universities, vocational schools, providing scholarships and specialized

training programs, and establishing vocational training programs and certifications, creating conditions for companies to provide in-house training.

*Secondly*, to enhance credit policies: Build a credit information system; Provide financial support to small and medium-sized enterprises through preferential credit and funding from investment organizations, create a favorable financial market environment, and develop diverse financial products; Strengthen credit risk control by developing credit risk policies and procedures, evaluating the financial capacity of customers, valuing collateral assets, utilizing technology for credit risk control, and training and improving the capacity of staff. Support training and capacity building for management; Promote cooperation among enterprises in the industry.

*Thirdly*, to improve insurance policies: Introduce policies to encourage logistics companies to participate in civil liability insurance; Provide financial support policies for logistics companies to participate in civil liability insurance; Implement risk assessment policies in cargo transportation activities; Enhance training and raise awareness about insurance.

*Fourthly*, to improve tax policies: Reduce import taxes on necessary equipment and devices in logistics operations; Apply value-added tax with a mechanism for reimbursement to logistics companies; Implement tax policies for logistics services, aiming to reduce or exempt taxes; Adjust tax policies related to the importation of goods through border gates, ports, and airports; Provide tax support policies for logistics companies carrying out research and development projects in the industry; Strengthen control, supervision, and anti-tax evasion measures in the logistics sector.

In addition to specific financial policy solutions, the government can implement parallel measures to further optimize logistics costs and address other industry limitations, including: Improving institutional frameworks; Accelerating digital transformation; Enhancing international cooperation in the logistics sector.

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## FACTORS AFFECTING THE CAPITAL STRUCTURE OF CONSTRUCTION COMPANIES LISTED IN VIETNAM

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**ABSTRACT:** *The research examines the determinants of the capital structure of construction enterprises in Vietnam from 2015 to 2021. The research sample comprises 30 listed construction companies. Empirical results indicate that company size, profitability, and solvency have significant impacts on the capital structure of enterprises in Vietnam's construction sector. Findings of the research will assist shelter building enterprises in Vietnam in determining the ideal financing structure for their operations.*

**Key words:** *Capital structure, factors, listed companies, construction sector, Vietnam*

### 1. INTRODUCTION

One of the most important duties for business managers is to choose the best financing plan for their company. Managers must consider not only the allocation and use of capital but also the proper method of acquiring capital when creating business financial policies. The average cost of capital is then reduced to the lowest possible level, maximizing the value of the enterprise.

Construction firms with features that demand an enormous amount of capital have to set up a suitable capital structure, assuring an appropriate ratio of equity to loan capital. Most listed construction companies conduct services such as directly participating in project construction, setting up the material supply chain, and supervising construction teams and subcontractor's project.

Understanding the importance of assessing the factors affecting capital structure in order to aid construction enterprises in establishing a reasonable capital structure and improving their competitiveness, the authors decided to carry out a study of the factors affecting the capital structure of listed construction companies in Vietnam. The outcomes of the study could help business managers in orienting themselves and choosing the appropriate financial structure for their company.

### 2. THEORETICAL FRAMEWORK

An enterprise's capital structure includes the arrangement and combination of equity, including preferred stock and common stock, and liabilities, including current short-term debt and long-term debt, to form the enterprise's business capital. Furthermore, capital structure affects profitability and business hazards that the organization may confront (Frank and Goyal, 2009). As a result, capital structure is frequently employed to finance a business's investment decisions.

Capital structure is a well-researched study from many different countries, here are some outstanding researches in the world and in Vietnam.

#### 2.1. Research on capital structure in the world

Jean. J. Chen (2003) used data from 77 companies listed in Shanghai for her research and found that factors affecting the capital structure of those companies included: profit, the ability to growth, tangible

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fixed assets, financial distress costs and tax-shield. This study was also based on the trade-off theory and pecking order theory. According to the results of this study, firm size and profitability have a negative relation to capital structure, although tangible fixed assets and growth rate are directly proportionate to the debt ratio.

Huang and Song (2006) stated that the tax shield, firm size, and fixed assets have a positive association with the enterprise's debt ratio, however the company industry and profit have an inverse link with the debt ratio. The conclusion was established after they carried out a research on 1000 listed companies in China during 1994 – 2003 period, in order to find the factors affecting the capital structure of Chinese companies. Besides, they also found that Chinese companies' capital structure was affected by the ownership structure of the firms

Wahab and Ramli (2014) did research of 13 out of 33 state-owned companies listed in Malaysia during 1997-2009 period. According to the outcomes of the research, while liquidity, size, and profitability are all negatively associated to debt ratio, tangible assets are positively related to debt ratio. Furthermore, the study suggests that the rate of economic growth and interest rate - these macro parameters - are negatively linked to the debt ratio of state-owned firms listed on the Malaysian stock exchange.

Wanrapee Banchuenvijit (2009) found that firm size is associated to debt ratio favorably, while profitability ratio and fixed assets are related to debt ratio adversely after conducted research on 81 companies listed on the Stock exchange of Thailand.

## **2.2. Research on capital structure in Vietnam**

Nguyen Thi Thuy Hanh (2019) analyzed secondary data from the financial statements of 38 commercial manufacturing business listed on HOSE and HNX, from 2009 to 2016 in order to understand the factors influencing the capital structure of commercial production organizations in Vietnam. According to the findings of the study, liquidity and state ownership have a negative impact on capital structure, whereas fixed assets and size have a favorable impact on capital structure.

Dang Thi Quynh Anh and Quach Thi Hai Yen (2014) stated that three main factors influencing the capital structure of firms are profitability, size and tax. The study was conducted by using FEM (Fixed Effect Model) method and the number of firms on the sample was 180 non-profit companies. According to the research, the association between size and profitability is positive, however, the relationship between tax and debt ratio of firms is negative.

Le Thi Minh Nguyen (2016) examined the factors influencing the capital structure of cement firms between 2007 and 2013. Based on the results of the study, profitability, firm age, and state ownership are all negatively connected with debt ratio. Meanwhile, the higher the debt-to-total-assets ratio, the larger the organization.

The study of Le Dat Chi (2013) identified six significant elements for assessing the factors that play an essential role in determining the capital structure of firms listed on the Vietnam stock exchange between 2007 and 2010. Taxes, inflation, market-to-book ratio, industry leverage, ROA, and management conduct are the actual repercussions. Furthermore, the study demonstrates that, based on the two traditional theoretical foundations of capital structure, namely the trade-off theory and the pecking order theory, capital structure planning of companies during the Research period is contrarian (strongly correlated with pecking order theory and not significantly with trade-off theory).

The authors continue to study, absorb, inherit, and create based on prior studies' theory and practice to assure scientific and practicality. As a result, the writers employ the following hypotheses:

- H1: The firm’s size has a positive impact on the debt ratio.
- H2: The enterprise’s solvency has a negative impact on the debt ratio.
- H3: The business’s profitability has a positive/negative impact on the debt ratio.
- H4: The enterprise’s asset structure has a negative impact on the debt ratio.
- H5: The enterprise’s growth rate has a positive/negative influence on the debt ratio.
- H6: Economic growth has a positive impact on the debt ratio.

### 3. DATA AND METHODOLOGY

#### 3.1. Data collection

Research subject: Factors influencing the capital structure of listed construction businesses in Vietnam. The study makes use of data obtained from the balance sheets and yearly audited financial statements of 30 Vietnam-listed construction businesses from 2015 to 2021.

#### 3.2. Analyzing data

Based on dialectical and historical materialist methodology, the study employed a combination of classic research methodologies such as comparison, analysis, statistics, and synthesis. Furthermore, the research uses econometric models to examine the influence of determinants on the capital structure of Vietnam’s listed construction businesses.

To aid the research process, the authors employed STATA software with panel data and a regression model to examine the determinants influencing enterprise capital structure. The original regression model (Pooled OLS), the random effect model (REM), and the fixed effect model (FEM) are all used in this thesis. The research team characterized the variable based on the gathered data for the minimum, maximum, mean, and standard deviation. Finally, to assess the relevance of independent variables, the group used multicollinearity tests, autocorrelation tests, and heteroscedasticity tests.

#### 3.3. Variables

##### 3.3.1. Dependent variables

We used the debt ratio variable (LEV) to describe the enterprise’s capital structure. The indicator reflects how much of the enterprise’s total capital is due. The LEV is calculated as follows:

$$LEV = \text{Total Liabilities} / \text{Total Assets}$$

##### 3.3.2. Independent variables

Based on the features of capital structure of listed construction businesses, real data, and performed investigations, the authors chose six factors to be used as independent variables in the model.

**Table 1: Independent variables**

Variables		Formula	Expectation
Company size	SIZE	SIZE = Log (Total Assets)	(+)
Liquidity	LIQ	LIQ = Short-term assets/ Short-term debt	(-)
Basic Earning Power	BEP	BEP = EBIT/Cost of borrowings	(+/-)
Assets structure	TANG	TANG = Tangible fixed assets/ Total assets	(-)
Company’s growth rate	GWLN	GWLN = (Net profit this period – Net profit previous period)/Net profit previous period	(+/-)
Economic growth rate	GDP	GDP growth rate	(+)

### 3.4. Research model

To examine factors affecting the capital structure of construction companies, we used the following model:

$$LEV_{it} = \alpha + \beta_1 * SIZE_{it} + \beta_2 * LIQ_{it} + \beta_3 * BEP_{it} + \beta_4 * TANG_{it} + \beta_5 * GWLN_{it} + \beta_6 * GDP_{it} + \epsilon_1$$

## 4. RESULTS

### 4.1. Data describing variables

**Table 2: Descriptive statistics of the variables in the model**

Variable	Obs	Mean	Std. Dev.	Min	Max
lev	210	.6878852	.1730621	.1727	.9924
size	210	6.144637	.3875734	5.5213	7.2493
liq	210	1.356243	.4902456	.5715	3.8699
bep	210	4.298472	6.236902	-9.1521	71.5215
tang	210	.057449	.0590105	.002	.428
gwn	210	.3155524	4.107857	-23.999	41.285
gdp	210	5.857143	1.98814	2.6	7.5

Source: The data was calculated on Stata

Table 5 displays descriptive data for the entire sample. In the period 2015-2021, the average debt ratio of listed construction businesses is 68.79%, while the average company size is 6.14, indicating that a company's average debt is somewhat more than shareholder equity. However, the degree of debt in certain businesses is quite high, with the highest being 0.99. The average solvency is 1.35, indicating that the average business can use short-term assets to pay off short-term creditors. Profitability has increased by 4.30% for businesses. Furthermore, the tangible fixed asset to total asset ratio is 5.75%. The influence of macroeconomic conditions on business success is shown through a dummy variable. It may be determined that firms must deal with economic changes during more than half of the research period (2012-2022). Inflation, interest rates, and the economic crisis all have a significant impact on business success.

**Table 3: Examine the correlation coefficient between the variables.**

	lev	size	liq	bep	tang	gwn	gdp
lev	1.0000						
size	-0.0601 0.3863	1.0000					
liq	-0.7637 0.0000	-0.0644 0.3531	1.0000				
bep	-0.3383 0.0000	-0.1148 0.0970	0.4775 0.0000	1.0000			
tang	0.1618 0.0190	-0.0143 0.8369	-0.2393 0.0005	0.0172 0.8042	1.0000		
gwn	0.0103 0.8821	0.0250 0.7186	-0.0488 0.4814	0.0412 0.5531	0.0153 0.8260	1.0000	
gdp	0.0939 0.1753	-0.0338 0.6258	-0.1050 0.1294	-0.0101 0.8843	0.0550 0.4279	-0.0686 0.3226	1.0000

Source: The data was calculated on Stata

The table depicts the correlation link between the variables in the model, which is used to forecast the direction of the influence of the components. At the 5% significance level, it can be observed that the variables in the model, LIQ, BEP, and TANG, are all tightly associated to LEV. At the 5% level of significance, the variables SIZE, GWLN, and GDP have no connection with LEV. Furthermore, several variables in the model are associated with one another. The authors will apply the test after generating the regression model to confirm whether or not there is multicollinearity.

#### 4.2. Regression models

The F-test has a p-value of  $0.0000 < 0.05$  after applying the FEM model, showing that the Pooled OLS model is not appropriate. As a result, the authors estimate the size by comparing the FEM model to REM to conduct and control for certain enterprise aspects. The author used the Hausman test to determine whether to use the FEM or REM model for regression. The Hausman test findings for the model in Table 5 reveal that  $\text{Prob}(\chi^2) = 0.0000 < 0.05$ , thus we may reject hypothesis  $H_0$  or the FEM model as the better appropriate model to do regression analysis scale for the research model.

To find out the influence of factors on the capital structure of listed construction businesses in Vietnam, the authors employ multivariate regression using the FEM model, using SIZE, LIQ, TANG, BEP, GWLN, and GDP as independent variables to determine whether capital structure is impacted by this factor. However, to have a stronger foundation for selecting a research model, the author's team tests and fixes any flaws in the model.

In practice, various approaches may be used to determine if the model contains multicollinearity problems, one of which is the measure of variance inflation factor (VIF). Because the VIF value is 1.15, the likelihood of multicollinearity is quite low.

In this research, the Wald test and the Wooldridge test were employed to investigate the phenomenon of heteroscedasticity and autocorrelation. The data are characterized by fluctuating variance and autocorrelation, as seen in Tables 4 and 5.

**Table 4: Result of Wald test**

```
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (30) =      5456.28
Prob>chi2 =      0.0000
```

*Source: The data was calculated on Stata*

**Table 5: Result of Wooldridge test**

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation

F( 1,      29) =      237.506
Prob > F =      0.0000
```

*Source: The data was calculated on Stata*



To reduce the impacts of variance and autocorrelation, we utilized Stata's Robust option. Table 6 shows the regression findings for 30 Vietnam-listed construction businesses.

**Table 6: Regression results for Robust model**

Fixed-effects (within) regression		Number of obs	=	210	
Group variable: mct		Number of groups	=	30	
R-sq: within	= 0.6116	Obs per group: min	=	7	
between	= 0.1632	avg	=	7.0	
overall	= 0.2351	max	=	7	
corr(u_i, Xb) = -0.2741		F(6,29)	=	22.69	
		Prob > F	=	0.0000	
(Std. Err. adjusted for 30 clusters in mct)					
lev	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]
size	.2212687	.0544559	4.06	0.000	.1098939 .3326435
liq	-.1853531	.0312793	-5.93	0.000	-.2493264 -.1213797
bep	.001604	.0006442	2.49	0.019	.0002865 .0029215
tang	-.1290837	.1863288	-0.69	0.494	-.5101689 .2520014
gwln	-.0009041	.0005652	-1.60	0.121	-.0020601 .0002519
gdp	.0049662	.0025692	1.93	0.063	-.0002884 .0102207
_cons	-.448628	.3347865	-1.34	0.191	-1.133343 .2360873
sigma_u	.15145437				
sigma_e	.0526047				
rho	.89234853	(fraction of variance due to u_i)			

Source: The data was calculated on Stata

The table above shows the regression findings for 30 Vietnam-listed construction businesses. The model's explanatory level is: At the 1% significance level, the SIZE and LIQ variables are statistically substantially linked with the LEV variable. At the 5% significance level, the BEP variable exhibits a statistically significant connection with the LEV variable. At the 10% significance level, the GDP variable shows a statistically significant association with the LEV variable. Variables TANG and GWLN were not statistically significant when linked with variable LEV. Furthermore, the factors included in the model explain 61.16% of the change in capital structure. Specifically:

- Firm size (SIZE): According to the model results, the correlation coefficient of firm size (SIZE) is 0.2213, indicating that this variable has the greatest influence on the capital structure of publicly traded enterprises. At a 1% importance level, the construction industry. Specifically, when the company's size rises by one unit and all other elements remain constant, the debt ratio increases by 0.2213. According to the positive correlation coefficient, business size has a beneficial influence on LEV. This finding indicates that larger enterprises in the sample borrow more and raise less equity. This finding is entirely compatible with pecking order theory and others, such as Jean. J. Chen (2003), Frank and Goyal (2009), Dang Thi Quynh Anh and Quach Thi Hai Yen (2014),...

- Liquidity (LIQ): The cash flow correlation coefficient is -0.1854, indicating a negative association between cash flow and LEV at the 1% significance level. When the company's solvency grows by one unit and all other elements remain unchanged, the debt ratio reduces by 0.1854. The results reveal that firms with strong solvency tend to issue more stock and less debt. This outcome is entirely compatible with the idea of pecking order theory, Nguyen Thi Thuy Hanh (2019), Wahab and Ramli (2014),...

- Profitability (BEP): Affects LEV at a 5% level of relevance. In this case, the correlation coefficient of the positive variable BEP is positively related to LEV. This conclusion is consistent with pecking order theory; firms do not need to mobilize much debt when they are profitable and have a large amount of accumulated earnings. This finding is consistent with the findings of Le Chi Dat (2013).

- Economic growth rate (GDP): At the 10% significance level, GDP has a positive influence on LEV. The pace of growth reflects the economic cycle. During times of sustained economic development, firms prefer to employ more debt to enhance financial leverage, hence boosting the profitability of the enterprise's equity. Specifically, the period 2015-2019 sees Vietnam's GDP develop at a reasonably high pace (about 7%). This phase helps to encourage publicly traded construction firms to rapidly grow their capital scale and raise the value of construction production. On the contrary, the economic growth rate decreases in the year 2020-2021 owing to the protracted impacts of the pandemic, listed construction businesses seek to reduce debt to maintain solvency, other obligations and other factors.

According to the model's results, the parameters TANG and GWLN have no statistically meaningful relationship with the capital structure of the sample's companies.

## 5. CONCLUSION

The study found that the factors influencing the capital structure of listed construction businesses in Vietnam are similar to other studies conducted both globally and locally. Company size, solvency, profitability, and economic growth rate all have a significant impact on the capital structure of Vietnam's listed construction businesses. However, in addition to the aforementioned criteria, there are numerous additional factors that affect the capital structure of the firm that are not addressed in the model, such as ownership structure, inflation, interest rates, and so on. As a result, the above model's results are simply one of the foundations for assisting construction firms in listing research and offering solutions according to the actual situations of enterprises.

The study of factors affecting the capital structure of listed construction businesses in Vietnam is regarded as particularly essential in the socioeconomic backdrop, as well as the challenges that the construction industry faces. with many current difficulties. According to the research findings, the capital structure of firms is greatly influenced by the size of the enterprise, its profitability, and its solvency.

Aside from the benefits that capital structure provides to listed construction companies in Vietnam, the study also highlights the fact that there are not really appropriate points in the capital structure in these enterprises, resulting in a capital structure that is not really optimal, causing limitations in the operation process. The preceding approach necessitates that enterprises perfect their capital structure. The above-mentioned listed construction firms' research data and model findings serve as the foundation for listed construction companies to offer beneficial to businesses solutions.

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## FACTORS AFFECTING THE PERSONAL FINANCIAL MANAGEMENT

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**ABSTRACT:** *The study identifies factors affecting personal financial management behaviors of young adults in Vietnam by examining the relationships among five factors including personal financial attitude, financial knowledge, locus of control, financial self-efficacy and personal financial management behaviors. The study's findings could be useful for organizations, government and other institutions to develop more projects in developing personal financial management.*

*Keywords: personal financial management behavior, financial attitude, financial knowledge, locus of control, financial self-efficacy.*

### 1. INTRODUCTION

In recent years, personal financial management practices in particular to youth has been contemporary issues for the society as a whole, which is considered as the huge challenges for youth globally (OECD, 2014). In the today's modernized age under the rapid globally economic developments, younger generations are growing up with higher living standards, non-stoppable growing in personal demands, especially in a culture of debt facilitated by a wide ranges of complexity financial products, credit choices and many different digital financial services. Therefore, it is alert for a surge in financial risks that youth have to confront with. In fact, it is pointed out that the financial and economic developments are not always matched by an increase in financial management skills of youth. According to OECD surveys conducted in 2014, young people tend to have lower levels of financial knowledge as well as attentions on personal finance compared with those of later generations. In Vietnam, an emerging economy, with relative low level of income, third of students in higher education always face up with problem of budget deficit because of spending most of received allowances from parents on personal interests like clothing, cosmetics, traveling, cinema tickets. These evidences prove that the young generation around the world do not have adequate essential abilities to manage their own finance. A failure in managing personal finances not only affects to each individual's current financial welling-being, but also accumulatively impacts on future saving goals and then leads to negative profound long-term influences in the financial systems as well as the comprehensive economic, financial and social stability and developments of a nation and even global scale (Faboyede et al., 2015). Hence, it is imperative for young adults to have sufficient financial management behaviors.

In general, Personal Financial Management Behavior (PFMB) is the subject of the financial discipline, regarding to all facet of behaviors related to process of planning, implementing and evaluating the cash flow, investments, risk management, retirement planning, tax planning, and estate planning. Another way, PFMB considers to all financial decisions and activities of each individual. Therefore, having solid PFMB enable individuals to be secured, have financial well-being, eventually obtain financial freedom and vice versa, the weak PFMB can lead to poor consequences like debt burdening, poor quality of life, mental health problems.

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Hence, in order to establish and enhance PFMB for young generation, it is necessary to determine factors affecting to PFMB, then propose suggestions and solutions to improve individual's PFMB.

In the global context, the term of PFMB is not innovative, there are many researchers attempting to determine and examine various factors impacted in PFMB under many different approaches in a wide range of sectors like psychology, sociology, finance, economics and event information technology (Ibrahim and Alqaydi, 2013; Robb and Sharpe, 2009). However, the differences in cultures, regions, levels of education, levels of economic and social development could have significant impacts on factors affecting PFMB. Besides that, such studies are still limited in the Vietnam context, especially studies considering young generations. Therefore, the purpose of this paper is determining and examining the factors affecting PFMB of Vietnamese young adults in the age of 18 to 30.

The paper comprises 5 sections. Section 2 refers to previous literatures regarding to PFMB and relevant factors. The following sections is selected methodology. Section 4 relates to results and discussions and final sections is conclusions and recommendations.

## **2. LITERATURE REVIEW**

### **2.1 Theoretical review**

#### **2.1.1. Theory of planned behavior**

As an extension of the original theory of reasoned action, in 1991 Ajzen continued to develop the theory of planned behavior which emphasizes the individual's intention which refers to three key elements including attitude, subjective norm, perceived behavioral control to perform a given behavior. This theory refers to general attitudes toward the behavior to the degree to which a person has favorable or unfavorable appraisal of the behavior. This evaluation is based on a person's beliefs on the expected outcome of his/her behavior. Experiments indicated that people tend to behave favorably if they believe their actions will have largely desirable consequences and vice versa, they form unfavorable attitudes towards the situations they expect and undesirable consequences. The second determinant of intention is subjective norm which is one of the social factors. This element is defined as the pressures perceived from society influences on the decision of performing or not performing the behavior. So, the subjective norm is the expected behaviors of individuals or groups that people believe. Another antecedent of intention is the degree of perceived behavioral control, which refers to a person's perception about whether performing the behavior is easy or difficult. Perceived behavioral control is supposed to reflect past experiences and forecasted impediments and obstacles. In other words, the perceived behavioral control is the people's level of confidence in their ability to control and monitor their actions. Overall, the theory of planned behavior affirms intention, perception of behavioral control, attitude toward the behavior and subjective norm present for each aspect of the behavior and can account for considerable changes in behavior. The more favorable the attitude and subjective norm, the higher level of perceived behavioral control, the stronger an individual's intention to perform the behavior under consideration. Based on the nature of each referred element, in the context of personal financial management, attitude towards the behavior could be linked to financial attitudes, subjective norm is relevant to financial self-efficacy and perceived control behavior may be similar to locus of control. Therefore, the theory gives a general view on the relationship between financial behavior and financial attitude, self-efficacy and locus of control.

#### **2.1.2. Social Cognitive Theory**

Social Cognitive Theory was introduced by Bandura in 1986, which is developed under the perspectives that learning is influenced by cognitive, behavioral and environmental factors. The theory proposes the

observation that others interact with one's own behavior and one's cognitive process to influence that individual's behavior. The theory emphasizes on the terms of "perceived self-efficacy" which is defined as people's judgments of their capabilities to organize and execute courses of action required to achieve targeted performances. It concerns an appraisal of what one can do with his or her possessed skills rather than skills one has. This theory also clearly distinguishes personal efficacy from the response to outcome expectations in which an individual's behaviors are influenced by expected consequences of an act. In more detail, people can believe that a course of actions will lead to certain outcomes, however they do not act based on such outcome beliefs since they are concerned about their abilities to execute necessary courses of action. Hence, it can be seen that the social cognitive theory could be used to explain how an individual's recognition of financial self-efficacy impacts financial management behaviors.

### **2.1.3. Social learning theory**

Social learning theory was introduced by Rotter in 1954. Different from traditional theories of learning, the theory indicates that behavior is not only the product of directly experienced response consequences, but also resulted from observation of other people's behavior and its consequences for them. An individual can learn by observing what is happening around and then learn them and learning rate a course of behaviors. For example, fearful and defensive behavior can be extinguished by observing others implementing the feared activities without any adverse consequences. The theory was constructed based on four main concepts including potential behavior, expectancy, reinforcement value and psychological situation. The potential behavior is defined as the possibility of doing a course of actions in a specific environment. Its possibility depends on perception or interpretation of the situation. Besides that, expectation refers to the perceived possibility that a particular activity can lead to an expected outcome. These expectations are formed based on previous experience and can be quantified. Actions are therefore regulated by anticipated consequences. However, an individual's cognitive capacity is not only affected by his or her experiences, but conditions of reinforcement. Furthermore, reinforcement value is related to the desirability of outcomes resulting from an individual's behavior. It depends on the learning one acquired and one's expectations. In fact, responses leading to unrewarding or punishing effects tend to be avoided or discarded whereas those that provide rewarding outcomes are retained and strengthened. Final component is the psychological situation, which is the combination of internal and external factors. An individual processes information from the environment then decides his or her behavioral response. This element refers to self-regulation which is the one's ability to arrange environmental incentives and apply consequences for specific situations. This psychological construct leads to important term of "Locus of control", which means that people with internal control expectation will receive situations, challenges in their life as contingent up on their characteristics and in contrast to those who are external control expectancies will more likely to perceive their challenges as contingent up on the luck and chance...

### **2.1.4. Family resource management theory**

Family resource management theory was introduced by Deacon and Firebaugh in 1988, which refers to the ability of a family in managing their resources to satisfy their needs and attain predetermined goals. The theory indicates a process of decision making starting from the inputs, followed by throughput and then obtaining output and then getting the feedback to reflect on inputs. This theory then has been applied in many latter studies, like Parrotta and Johnson (1996) describe the financial management systems as process starting from input which is financial knowledge and the following throughput including financial attitude, then resulting financial management behavior. Accordingly, this financial management conceptual framework proposes that financial attitude and financial knowledge are two critical factors to determine the personal financial management behaviors.

## 2.2. Empirical Review and Hypothesis Development

The previous literatures have identified various factors affecting PFMB under different perspectives. However, based on studies and characteristics of young Vietnamese as well as Vietnamese culture and region, the paper emphasis on testing the relationship between financial behavior and financial attitude, financial knowledge, locus of control and financial self-efficacy.

***Hypothesis 1 (H1): The relationship between financial attitudes and Personal Financial Management Behaviors is a positive correlation.***

Parrota and Johnson (1998) defined financial attitude as the psychological inclinations expressed under judgements of financial management practices. It refers to the ability to plan ahead, control and maintain a saving amount for financial issues. There are several studies advocated the positive relation between financial attitudes and personal financial management behaviors (Dwiastani, 2017; Ameliawati and Setiyani, 2018). They all agreed that the attitudes toward financial matters play as a key element to decide how a person manage his/her financial resources.

***Hypothesis 2 (H2): Financial knowledge and Personal Financial Management Behaviors are positively correlated.***

According to Chowa, Despard, and Akoto (2012), financial knowledge refers to the individual's competence in applying his/her knowledge into making appropriate financial decisions. It is clearly, financial knowledge plays an essential role to explain the variations in individuals' behaviors and their financial outcomes. A positive association between financial knowledges and PFMB is concluded by various studies. Robb and Woodyard (2011) and Zakaria et al. (2012) found that people possessing high level of financial knowledge tend to make financial decisions responsibly and manage their money efficiently and effectively. Van Rooij et al. (2011) determined the level of financial knowledge impact significantly on retirement planning, which means that financial knowledgeable people are able to better prepare for their future. Especially, in the context of digital transformation and the appearances of wide ranges of digital financial services, financial knowledge affects positively to the adoption of online services for making saving or investments or using debit and credit cards for daily payments (Sharma and Joshi, 2015; Roy and Jain, 2018).

***Hypothesis 3 (H3): Financial knowledge moderates the relationship between financial attitudes and financial management.***

Eagly and Chaiken (1993) supposed that the relationship between financial attitudes and PFMB could be affected by other correlated factors such as competence in finance. In research conducted by Bhushan and Medury in 2014, the good and reasonable educational programs or trainings are able to enhance personal financial attitude toward financial decision making such as lessening frequency of using credit cards. Joo and Grable (2004) found the interconnection between financial knowledge, financial attitude and financial behaviors. They indicate high level of perceptions on what people are considering are able to derive their attitudes on decision-making.

***Hypothesis 4 (H4): There is a negative relationship between external locus of control and Personal Financial Management Behavior***

According to Hellrigel et al. (2010), locus of control relates to an individual's belief that they are able to control over events that impact them. Internal control and external control were two aspects of the locus of control. Those with an internal center of control are more likely to be goal-oriented. External control refers to occurrences that were under the control of others, such as luck, chance, and fate (Hoffman et al., 2000). According to Mien & Thao (2015), the external locus of control negatively affects the Personal

Financial Management Behavior of young adults: people who have a stronger sense of external control exhibit poorer financial management skills.

**Hypothesis 5 (H5): Locus of control plays a mediating role in relation between financial knowledge and personal financial management behaviors**

Many literatures found a consideration impact of locus of control on the association between financial knowledge and personal financial management (Hayes, 2006; Zakaria et al., 2012; Perry and Morris, 2005; Mien & Thao, 2015). They identified that financial knowledge cannot be applied into practices if individuals do not have ability to control and monitor their financial decisions.

**Hypothesis 6 (H6): Financial self-efficacy and financial management behavior are positively correlated.**

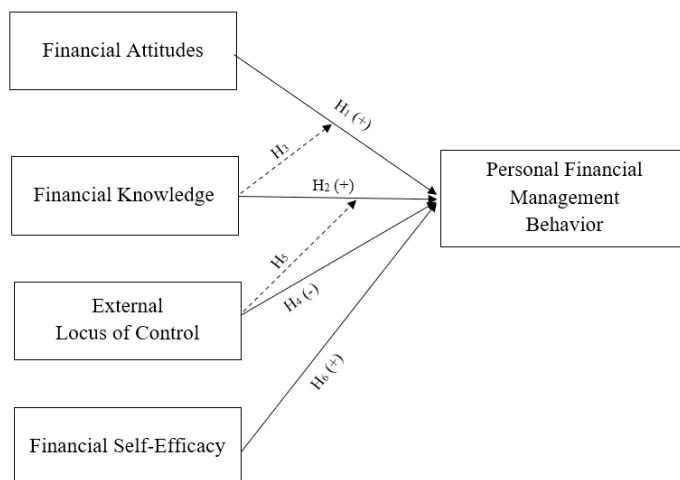
**Hypothesis 7 (H7): Financial self-efficacy impacts positively on the relation between financial attitudes and personal financial management behavior.**

Self-efficacy refers to a person’s belief in their ability to perform at a certain level and exercise control over events in their life (Bandura, 1994). Therefore, under perspective of financial management behavior, a person who has strong self -efficacy tends to consider financial difficulties in their life as challenges to be overcome rather than threats to be avoided. In the later studies, Qamar, Khemta, and Jamil (2016); Farrell et al., (2016); Asandhimitra & Kautsar (2020) asserted that the higher level of self-efficacy the more responsible individuals will be in making their financial decisions.

Besides that, Qamar, Khemta, and Jamil (2016) found a positive moderating role of financial self-efficacy affects to the association between financial attitudes and personal financial management.

**2.3. Conceptual model**

A conceptual model is suggested based on the findings mentioned above. Following are specifics on the conceptual model and related hypotheses:



**Figure 1. Conceptual framework for the research**

Source: the figure was synergized by authors

**3. RESEARCH METHOD**

**3.1. Research design**

To examine the relations between factors and personal financial management behaviors, the study adopts a mixed method, using both qualitative and quantitative approach. In this paper, there are 05 constructs examined



including personal financial management behavior (PFMB), financial attitude (FA), financial knowledge (FK), locus of control (LC) and financial self-efficacy (FSE). In order to measure these constructs, a questionnaire has been made based on previous studies and has been moderated to be suitable with Vietnamese cultures and life styles as well as younger generation. Personal financial management behavior was measured by 11 items. 15 items were used to estimate financial attitudes. Financial knowledge was measured by 6 items in terms of individual's self-assessment of knowledge of financial issues, financial self-efficacy was measured by 4 items and there are 6 items used to measure external locus of control. Five-point Likert-type scale was used for all items in this study. The questionnaire was firstly made in English, then was translated into Vietnamese to ensure respondents in Vietnam can understand. The questionnaire comprises 2 parts: first part refers to respondents' information and characteristics and second part contains items to measure five constructs in the proposed model.

### **3.2. Sample**

The study population includes the adult youth studying or working in Vietnam from 18 to 30 years old. Total 230 questionnaires have been sent to respondents. After the collection, 218 questionnaires are acceptable.

### **3.3. Research method**

The first step of testing collected data is using Cronbach's alpha to test the reliability of data. After that, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were adopted to test the validity of measurement scales. Convergent validity and discriminant validity of data is assessed through Average Variance Extracted (AVE). The discriminant validity is assessed through Fornell - Lacker Criterion. Then the structural equation model (SEM) was applied to analyze the research model to test the hypotheses. The data was analyzed by both SPSS and AMOS package.

## **4. RESEARCH AND DISCUSSION**

### **4.1. Respondents' characteristics**

Total 218 responds are gathered from 18- to 30-year-old. According to the collected data, in total of respondents, male and female achieved 46.8%, 53.2% respectively. Age ranged from 18 to 30 years old, in which 58.2% of respondents from 18 to 22 years old, 18.8% from 23 to 26 years old and 22.9% from 27 to 30 years old. Regarding marital status, 76.1% of respondents unmarried and 23.9% of respondents married. The academic levels of respondents are relatively low with 39.9% of respondents being under bachelor, 38.5% of respondents' education level in bachelor and only 21.6% of respondents being in master degree or above. The employment status was represented with 54.1% of respondents are students and 45.9% are working full-time. Regarding to educational background, 43.1% of respondents are working in non-finance and 56.9% of them having finance or related finance background. 33.5% of the respondents have the income under 2 million VND per month, 20.6% of respondents have the income ranging from 2 to 5 million VND per month, 11.5% of respondents earn amount of money from 5 to 10 million VND per month and 34,4% have income above 10 million VND. This could be matched by the percentages of employment status.

### **4.2. Results**

The reliability of all scales in the main survey was examined by using Cronbach's alpha. The results showed that, almost scales met requirement of reliability, however eight items gained low corrected item-total correlation (under 0.3). These eight items were deleted from the measurement scale, which results to a significant increase of Cronbach's alpha (all Cronbach's alpha is higher than 0.8 except financial self-efficacy, just achieving 0.697).

After testing Cronbach's alpha coefficient, all measures were analyzed by EFA. The KMO value (0.882) is higher than 0.5, indicating the presence of a strong partial correlation. The significant value of Bartlett's test is 0.000, less than 5%, which means that the correlation matrix is indeed not an identity matrix. As the result, the test's results confirm that the data is suitable for factor analysis. There were 7 factors gaining the eigenvalues greater than 1 and simultaneously the extraction sum of squared loading indicated that 7 factors were extracted; the information contained in the original variables could be explained by 64.612%. However, the result is not aligned with determined constructs in part of literature review, therefore seven variables were removed from measurement to enhance the significance of analysis. After that, extraction method of principle axis factoring analysis was continued to be used to identify factors. As the result, KMO value is 0.871, significant value of Bartlett's test is 0.000, confirming the data set is still suitable for factor analysis. There were 5 factors extracted and it could explain 60,337% the information contained in the original variables. These 5 factors are matched well by the determined constructs.

To establish convergent validity and discriminant validity, AVE and Fornell-lacker criterion has been used. In order to convergent validity were within the acceptable value, 5 items having CR less than 0.7 and AVE less than 0.5 were removed, including FA11, FSE4, PFMB1, FSE3, PFMB6.

The CFA result indicated that the measurement model of all five factors received an acceptable fit of data: Chi-square = 371.782 (p-value = 0,000<0,05), CMIN/df = 199, CFI = 0.923, TLI =0.911, RMSE = 0.063 and GFI = 0.858. The finding indicated that all scales measuring the components of all constructs are validity.

All proposed hypotheses are tested by the structural model. The chi-square divided by degree of freedom was 1.9715 less than 3, the RMSEA value is 0,067 less than 0.8, CFI and TLI indices were 0,914 and 0,9 respectively (both are greater than 0.8), GFI is 0,914, so the model was acceptable.

Hypothesis 1 assumed that, financial attitude has a positive relation with financial behavior, however the result shows a p-value =0.241 greater than 0,1. Therefore, it means that financial attitude does not have effect on personal financial management behavior.

Regression estimator of relationship between financial knowledge and financial behavior is 0.25 with p-value is 0.007, which means the higher level of financial knowledge, the more responsible in financial behavior. The impact of financial knowledge was confirmed to financial behavior. Besides that, financial knowledge has a direct impact on financial attitude with coefficient is 0.141. However, there are no relation between financial attitude and financial behavior, so the hypothesis 3 does not support. The coefficient of external locus of control is -0.438 less than 0 (p-value=0.003), which means external locus of control has a negative effect on personal financial management behavior. In addition, financial knowledge has significant negative impact on external locus of control with regression coefficient is -0.452. The result of Sobel test indicated locus of control was a mediator of the relationship between financial knowledge and personal financial management behavior (P-value = 0.004). Apart from that, financial self-efficacy affects positively to financial behavior. The coefficient represented for this relationship was 0.258 at the significant level 0.05.

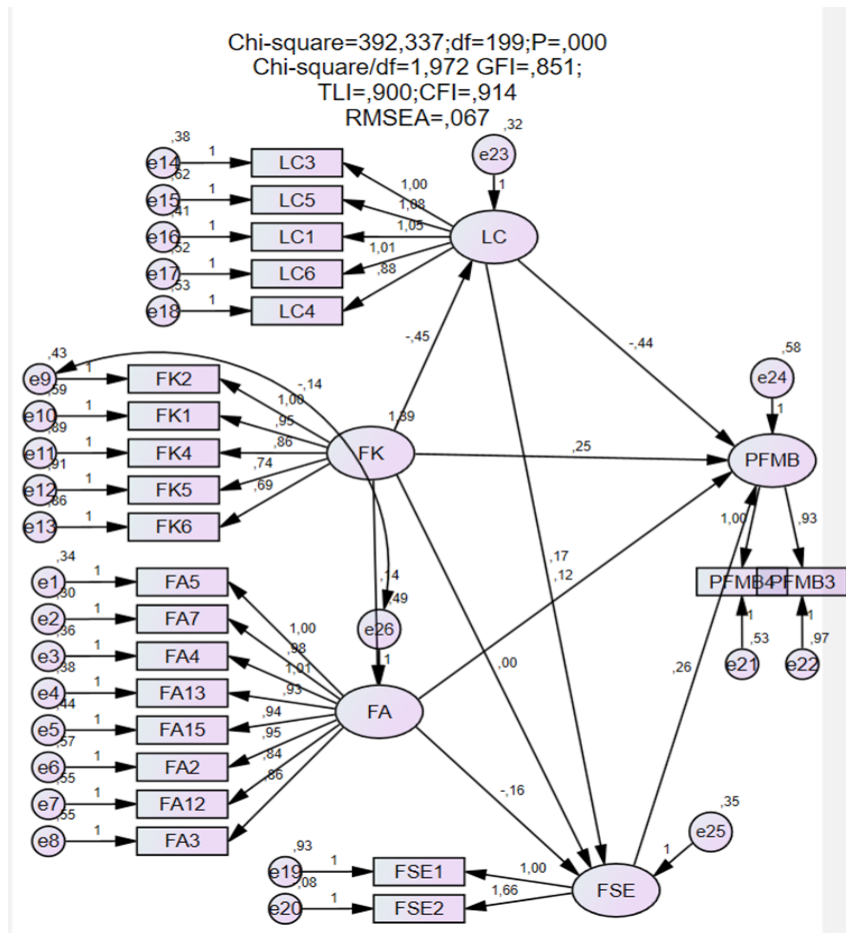


Figure 2. Results of structured model using SEM

Source: The data was extracted from software AMOS 24

			Estimate	S.E.	C.R.	P
LC	<---	FK	-0.452	0.05	-9.079	***
FA	<---	FK	0.141	0.049	2.901	0.004
FSE	<---	LC	0.165	0.099	1.677	0.094
FSE	<---	FA	-0.157	0.08	-1.968	0.049
FSE	<---	FK	0	0.053	0.001	0.999
PFMB	<---	LC	-0.438	0.145	-3.02	0.003
PFMB	<---	FK	0.25	0.093	2.683	0.007
PFMB	<---	FA	0.123	0.105	1.173	0.241
PFMB	<---	FSE	0.258	0.113	2.275	0.023

Table 1: Result of hypothesis testing

Source: The data was extracted from software AMOS 24

4.3. Discussion

The descriptive analysis of the study revealed that the average respondents have good behaviors towards managing financial resources responsibly. Besides, they also have strong competences in financial knowledge as well as have good attitudes to financial management practices. However, the results showed that nowadays, average young adults in the sample are lack of confident to make important decisions related

to financial resources as well as dealing with financial challenges in their life. Apart from that young adults are more likely to be influenced on external factors in financial management practices.

The data analysis surprisingly revealed that Vietnamese young adults' attitude towards financial activities did not influence their personal financial management behavior, though many researches indicated the opposite: Abeyrathna (2020) discovered that financial attitude has a positive influence on personal financial management behavior; Dwiastani (2017) also claimed that a person's ideas, attitudes, and judgments about their financial status will influence the things they do.

The reason is that, through the study, Vietnamese young adults' financial attitude is shown to be affected by their financial knowledge – it means that in order for an individual to develop their attitude towards finance or financial activities, they must have enough understanding of finance or financial activities itself. The result can be seen to be the same in Harsha's (2013) study, indicating that financial literacy leads to controlled spending behavior and encourages saving behavior and also has a significant impact on investment decisions of investors; however, differs from Parrotta and Johnson's (1998) research, which refers that financial attitudes predict financial management better than financial knowledge. The analysis, therefore, emergently points out that young individuals in Vietnam need more proper financial literacy, which comes from the lack of financial knowledge being taught in Vietnam's education system.

Consequently, the study found that financial knowledge also has a significant positive relationship with personal financial management behavior. It means that financial knowledge is also a factor that impacts on financial management behavior of a person. It shows that people who have a great deal of knowledge about finance tend to make decisions about spending, investing and insurance wisely compared with less knowledgeable people. The current finding supports the findings from Chen and Volpe (1998), Lusardi (2008), Agung (2016).

The study also discovered a substantial negative link between external locus of control and personal financial management behavior. It signifies that a person's financial management conduct is influenced by his or her external locus of control. It also suggests that someone with an outside perspective does not manage their money wisely. The current conclusion is consistent with the findings of Perry and Morris (2005), Mien and Thao (2015), Bapat (2020), Sovitha and Thavakumar (2020), and Mutlu and Ozer (2021).

Besides that, different from previous studies conducted in Vietnam such as Mien and Thao (2015), the study also found that the relationship between financial knowledge and personal financial management behavior is mediated by external locus of control. It implies that an external factor can influence a person's psychology leading to the ability to apply financial knowledge. Therefore, when a person believes that he/she cannot control his/her fortune, it is too difficult for him/her to make financial decisions based on his/her financial knowledge because that person does not have enough motivation and confidence to take action. It might be true for young Vietnamese people as theory and practice are not always going together and behaviors in management are sometime more influenced by psychology factors and people's characteristics rather than their knowledge. The current finding again confirms the main ideas of social learning theory and other the previous empirical research from Hayes (2006), Grable et al. (2009) and Zakaria et al. (2012).

The study also discovered a substantial positive association between financial self-efficacy and personal financial management behavior. This suggests that financial self-efficacy is another aspect that determines a person's financial management behavior. It also means that a person who is confident in his or her ability to manage money manages his or her money properly. The current conclusion is consistent with the findings of Qamar, Khemta, and Jamil (2016), Farrell, Fry, and Risse (2016), Asandimitra and Kautsar

(2020), Asmin et al. (2021), and Chong et al (2021). Another study conclusion demonstrated a substantial positive association between self-control and personal financial management behavior. It means that a person with self-control may responsibly manage his or her finances. In other words, self-control has a good impact on a person's money management habit. The current findings corroborate those of Miotto and Parente (2015), Strömbäck et al. (2017), and Siswanti and Halida (2020). The positive relationship between financial self-efficacy and personal financial management behaviors found in this study is also in align with the social learning theory.

Overall, these findings suggest that for Vietnamese younger generation, being competence in finance, self-oriented approach in financial decision making and being confident in ability of handling financial complexity are main factors affecting their responsibly financial behaviors. The current study has attempted to fill a gap in Vietnamese literature and has practical implications for future studies in the context of Vietnam. The study will be beneficial to students, and financial counselors.

## 5. IMPLICATIONS

Firstly, for educational organizations, government agencies, the labor Union at companies, it is necessary to organize more and more financial seminars, workshops to emphasize the importance of responsible financial management behavior. The students and employees should be trained to take responsibility for their financial decisions.

Secondly, educational initiatives, educational organizations should pay more attentions on providing more lectures, training programs or even online courses to equip for young people basic financial knowledge enabling them to enhance the effectiveness and efficiency in using, allocating and managing their finance resources. Especially in context of rapid digital transformation, there are more and more innovative financial products and services, therefore to help young people avoid fall in the trap of financial risks, implementing programs to improve financial levels is urgent demands.

Thirdly, for parents who have children are in college-age, it is necessary to forecast their children financial management behaviors based on their locus of control, knowledge, self-efficacy. Then they are able to have reasonable monitor in their children's financial management behavior.

Finally, for individuals, young adults should have a positive attitude to acquire and cultivate financial knowledge. Through a number of methods such as: taking courses on financial information, or simply learning some basic information about finance to be able to manage finances well. In addition, for individuals who are using digital financial services such as online loans, credit cards, etc., they must pay more attention to improving their understanding of different types of financial services. This is because it contains many risks, if not knowledgeable enough, users will easily fall into a situation of losing money, or taking out loans beyond their ability to pay, these are typical examples for poor managing finances.

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## SOLUTIONS TO IMPROVE BUSINESS EFFICIENCY OF LISTED SEAFOOD COMPANIES IN VIETNAM

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*Abstract: The study examines factors affecting business efficiency of listed seafood enterprises in Vietnam; from there propose solutions to improve business efficiency of these companies. Specifically, the paper determines the direction and extent of influence on return on assets (ROA) and return on equity (ROE) of the following factors: ASSETS (enterprise size), GROWTH (business growth), LIABILITY (debt ratio), RECEIVE (receivable turnover), INVEN (inventory turnover). The study was conducted based on data collected from 10 listed seafood companies over the period from 2017 to 2021. The study also uses quantitative methods combined with multivariable regression models to examine the hypotheses. Findings indicate that variables of ASSET, INVEN, RECEIVE have positive impact with ROA; ASSET, INVEN, RECEIVE, LIABILITY have positive impact with ROE. In accordance with the research findings, the authors propose specific recommendations and solutions to improve the business performance of seafood companies listed in Vietnam.*

*Keyword: seafood enterprise, business efficiency, impacting factor, financial performance*

### I. INTRODUCTION

Fishery is one of the key economic sectors of the country. In recent years, the fishery industry has made a positive contribution to the transformation of agricultural and rural economic structure and has made a relatively large contribution to Vietnam's export turnover for many years. However, in the current period, under the influence of many factors, our seafood industry also has certain difficulties, making the production and business situation of seafood enterprises facing many challenges. This requires seafood enterprises in general and listed seafood companies in particular to improve business performance in order to increase the health of businesses as well as increase competitiveness in the market. .

In such conditions, how to maintain business efficiency, generate profits, and long-term and sustainable development direction for enterprises is an urgent question for each listed seafood enterprise in Vietnam in the current period. Understanding this as well as the fact that seafood enterprises have not yet optimized their business advantages, the authors chose to study Return on assets (ROA) and return on equity (ROE) - two factors that characterize the business performance of businesses. The study analyzes the influence of the basic factors affecting the business performance of seafood enterprises, finding solutions to improve business efficiency.

**Table 1: The sample of the study**

No.	Company's name	Code/Stock exchange
1	Minh Phu Seafood Corporation JSC	MPC/UPCOM
2	Vinh Hoan Joint Stock Company	VHC/HOSE
3	Multinational Development and Investment JSC - IDI	IDI/HOSE
4	Nam Viet Joint Stock Company	ANV/HOSE
5	Sao Ta Food Joint Stock Company	FMC/HOSE
6	Cuu Long An Giang Seafood Import-Export JSC	ACL/HOSE

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7	Camimex Group Joint Stock Company	CMX/HOSE
8	Ben Tre Seafood Import Export JSC	ABT/HOSE
9	Kien Hung Joint Stock Company	KHS/HNX
10	Mekong Seafood Joint Stock Company	AAM/HOSE

The research team selected a sample of 10 representative seafood enterprises below on the basis of:

- Firstly, these are enterprises of different sizes in the seafood industry with capital from 100 billion to 8000 billion and stable operation in the period 2017 - 2021.
- Secondly, they are all listed on the stock market (on HOSE/HNX/UPCOM) and have full information on audited financial statements for research purposes.
- Thirdly, choose reputable leading enterprises and have a large market share in the seafood industry such as Minh Phu Joint Stock Company as the “*flagship*” of the enterprise sector in shrimp export or Vinh Hoan Joint Stock Company which is confirmed as Vietnam’s No. 1 catfish exporter

## 2. THEORETICAL FRAMEWORK

Business efficiency is the top concern of businesses, as it is the standard and measure of all activities. Business is the process of carrying out some or all of the stages from investment in production to consumption or providing services in the market for the purpose of profit. Therefore, business efficiency is a challenge that most businesses have to deal with and has become a topic of research in recent years, including:

(1) PhD thesis in Economics by Mai Thi Dieu Hang (Financial Academy, 2019) - “*Enhancing business efficiency of seafood companies in Vietnam*”. The thesis evaluated the business situation of listed seafood companies in the Vietnamese stock market, and proposed specific solutions and implementation conditions to improve their business efficiency.

(2) PhD thesis in Economics by Pham Thi Minh Hien (Financial Academy, 2011) - “*Using financial tools to enhance the competitiveness of Vietnam’s textile and garment industry in the context of WTO accession*”. The thesis evaluated the use of financial tools to enhance the competitiveness of Vietnam’s textile and garment industry and proposed solutions to use macro financial tools to improve the industry’s competitiveness in the context of Vietnam’s WTO accession.

(3) PhD thesis in Economics by Nguyen Phuong Anh (Financial Academy, 2021) - “*Business efficiency of member securities companies of stock exchanges in Vietnam*”. The thesis evaluated the business efficiency of member securities companies of stock exchanges in Vietnam and proposed solutions to improve their efficiency.

(4) Master’s thesis in Economics by Hoang Ha Mi (Hai Phong Private University, 2018) - “*Some solutions to improve business efficiency in Northern steel companies*”. The thesis evaluated the business efficiency of Northern steel companies and proposed solutions to improve their business efficiency in the future.

(5) Master’s thesis in Business Administration by Vo Thi Tuyet Hang (Da Nang University, 2015) - “*Factors affecting the business efficiency of construction companies listed on the Vietnamese stock market*”. The thesis studied the factors affecting the business efficiency of construction companies and proposed measures to improve their business efficiency.

(6) PhD thesis in Economics by Doan Thuc Quyen (Financial Academy, 2015) - “*Solutions to improve the business efficiency of listed manufacturing companies in the Vietnamese stock market*”. The thesis evaluated the business efficiency of listed manufacturing companies in the Vietnamese stock market and proposed solutions to improve their business efficiency.



Based on reports and studies which have the similar research topic, with a serious study of the theory and analysis of business efficiency of cement businesses, the article “BUSINESS PERFORMANCE OF LISTED SEAFOOD JOINT STOCK COMPANIES ON THE STOCK EXCHANGE IN VIETNAM” will contribute to clarifying some basic issues in the theory of business performance along with the current situation and proposing solutions to improve the business efficiency situation in general and all the ratio in particular at listed companies.

### 3. RESEARCH METHOD

The object of the study: Business efficiency of Vietnamese seafood industry enterprises

Research scope:

- Spatial scope: The topic is studied in 10 seafood industry enterprises listed on the Vietnamese stock market.

- Time scope: Studying the business efficiency of 10 seafood industry enterprises listed on the Vietnamese stock market during the period 2017 - 2021.

The authors use a variety of research methods such as:

- Qualitative method: collect empirical information and data over time (secondary data of stocks is obtained from websites such as: <https://vietstock.vn>; <https://cafef.vn>; <https://fireant.vn>).

- Method of calculation and comparison: select the appropriate criteria for calculation and set out in the article, from which it can be compared with other similar indicators.

- Forecasting method: based on the calculated and collected results, the authors make a forecast about the development trend in the next periods of the object being evaluated.

The combination and use of many different research methods is aimed at helping the process of studying the current situation of business efficiency of listed seafood companies in Vietnam with high reliability and achieving better quality.

### 4. RESULTS AND DISCUSSION

- Basis for building models of factors affecting business performance

**Table 2: Summary of factors and hypotheses in the study**

Factor	Variable	Hypothesis	Symbol
Business efficiency	Return on assets		ROA
	Return on equity		ROE
Enterprise size	Total assets	+	ASSETS
Business growth	Revenue growth rate	+	GROWTH
Capital structure	Debt ratio	+/-	LIABILITY
Inventory management	Inventory turnover	+/-	INVEN
Receivables administration	Receive turnover	+/-	RECEIVE

\* Data collection

The group compiles information on the production and commercial operations of 10 seafood companies listed on the stock market based on information from the audited financial statements of the enterprises in the sample. Securities for Vietnam from 2017 until 2021. The dependent variables ROA and ROE as well as the independent variables employed in the research model are then calculated using the financial statement.

\* Setting up a research model:

$$ROA_{it} = \beta_0 + \beta_1 \log(\text{ASSETS})_{it} + \beta_2 \text{GROWTH}_{it} + \beta_3 \text{LIABILITY}_{it} + \beta_4 \text{INVEN}_{it} + \beta_5 \text{RECEIVE}_{it} + \varepsilon_{it}$$

$$ROE_{it} = \beta_0 + \beta_1 \log(\text{ASSETS})_{it} + \beta_2 \text{GROWTH}_{it} + \beta_3 \text{LIABILITY}_{it} + \beta_4 \text{INVEN}_{it} + \beta_5 \text{RECEIVE}_{it} + \varepsilon_{it}$$

Include:

*ROA: Return on assets*

*ROE: Return on equity*

*ASSETS: Total assets*

*GROWTH: Revenue growth rate*

*LIABILITY: Debt ratio*

*INVEN: Inventory turnover*

*RECEIVE: Receive turnover*

*i: company i*

*t: year t*

**Table 3 : Descriptive statistics of ROA and ROE**

	ROA	ROE
Mean	0.0741766	0.1473183
Min	-0.0546031	-0.0590211
Max	0.3251844	0.5370391
Std.Dev.	0.0646194	0.1216853
Obs	50	50

(Calculated from Stata 17)

The descriptive statistics reveal that there are a total of 50 observations, corresponding to a sample of 10 seafood businesses from 2017-2021. The lowest ROA in the sample is -5.46%, while the highest is 32.52%. The average ROA is 7.42%, with a standard deviation of 6.46%, which is relatively close to the mean value. This indicates that there are some differences in the ROA of the businesses. Similarly, the lowest ROE value in the sample is -5.90%, while the highest is 53.70%. The average ROE is 14.73%, with a corresponding standard deviation of 12.17%, which also indicates that there are some differences in the ROE of the businesses.

**Table 4: Descriptive statistics of explanatory variables**

	ASSETS	GROWTH	LIABILITY	INVEN	RECEIVE
Mean	6.189387	-0.358723	0.4285656	28.19523	6.29687
Min	5.303384	-11.57104	0.0336223	0	0.4453479
Max	6.920503	0.97495	0.8507865	1068.747	15.91671
Std.Dev.	0.5120066	1.875422	0.1953017	151.2371	3.706958
Obs	50	50	50	50	50

(Calculated from Stata 17)

In terms of independent variables, the scale of company assets (ASSETS) showed a deviation with a standard deviation of 51.12%. As for the revenue growth rate (GROWTH), the values ranged from -1157.0% to 97.49%, with a standard deviation of 187.54% and an average of -35.87%. This indicates

strong differences and fluctuations, such as Camimex Joint Stock Company (CMX) with negative revenue growth rate during the period of 2019-2021.

Regarding capital structure (LIABILITY), the average value was 42.85% with a standard deviation of 9.53%. This suggests that companies have a debt-to-equity ratio of nearly 50% of the total capital, and the standard deviation also shows a certain difference between companies. For example, Cuu Long An Giang Seafood Import and Export Corporation (ACL) has a high capital structure ranging from 53% to 65%, whereas companies like Mekong Seafood Joint Stock Company (AAM) almost entirely use owner's equity with a capital structure below 10%.

The other two indicators, inventory management and accounts receivable management, also showed strong fluctuations, with standard deviations of 15123.71 rounds and 370.69 days respectively, due to CMX's restructuring of the entire company, leading to significant impacts on these indicators. Therefore, the practical group tested regression models to overcome these shortcomings and understand the impact of factors on business efficiency.

**Table 5: Results of regression models**

Model	ROA			ROE		
	Pooled OLS	FEM	REM	Pooled OLS	FEM	REM
ASSETS	0.0738658 (0.000)	-0.0240976 (0.828)	0.0709406 (0.009)	0.1093079 (0.003)	-0.2222778 (0.307)	0.1053999 (0.009)
GROWTH	0.0025299 (0.640)	0.0025472 (0.657)	0.0018829 (0.709)	0.0076832 (0.446)	0.0100263 (0.373)	0.0071853 (0.466)
LIABILITY	-0.0296547 (0.497)	-0.022649 (0.767)	-0.0216054 (0.681)	0.1026375 (0.208)	0.0968081 (0.518)	0.1109387 (0.214)
INVEN	0.0000947 (0.145)	0.0000857 (0.193)	0.0000964 (0.104)	0.0002237 (0.066)	0.0002068 (0.110)	0.000227 (0.051)
RECEIVE	0.0074674 (0.005)	0.0087589 (0.115)	0.0082191 (0.012)	0.0142753 (0.004)	0.0120134 (0.263)	0.0144769 (0.006)
Số quan sát (N)	50	50	50	50	50	50
R-squared	32.68%	52.13%	32.32%	34.52%	48.63%	34.46%
F (Wald-Chi <sup>2</sup> )	4.27 (0.0030)	2.72 (0.0082)	12.76 (0.0257)	4.64 (0.0017)	2.37 (0.0195)	18.19 (0.0027)

(Calculated from Stata 17; P-values are enclosed in parentheses)

The study is conducted using three models: Pooled OLS, FEM, and REM. Then, the most suitable model is selected based on F-test, Hausman, and Breusch and Pagan LM tests.

**Table 6: Summary of selection tests between 3 models Pooled OLS, FEM and REM**

Accreditation	ROA			ROE		
	Pooled OLS & FEM	FEM & REM	Pooled OLS & REM	Pooled OLS & FEM	FEM & REM	Pooled OLS & REM
F test	F(9, 35) = 1.58 Prob > F = 0.1595			F(9, 35) = 1.07 Prob > F = 0.4097		
Hausman test		chi2(5) = 1.19 Prob > chi2 = 0.9460			chi2(5) = 2.89 Prob > chi2 = 0.7175	

LM test			chibar2(01) = 0.62 Prob > chibar2 = 0.2156			chibar2(01) = 0.33 Prob > chibar2 = 0.2818
Conclude	Choose OLS	Choose REM	Choose OLS	Choose OLS	Choose REM	Choose OLS

(Calculated from Stata 17)

Results show that both ROA and ROE regression functions are more suitable for the Pooled OLS model. The group performed tests for heteroscedasticity and autocorrelation for both ROA and ROE regression functions.

**Table 7: Variance and autocorrelation tests for regression ROA and ROE**

Accreditation	ROA . regression	ROE . regression
Variance of variable error	chi2 (1) = 3.17 Prob>chi2 = 0.0749 > 0.05	chi2 (1) = 1.79 Prob>chi2 = 0.1815 > 0.05
Autocorrelation	F(1, 9) = 6.503 Prob > F = 0.0312 < 0.05	F(1, 9) = 8.157 Prob > F = 0.0189 < 0.05

(Calculated from Stata 17; P-values are enclosed in parentheses)

The results show that both models do not have variable variance but have autocorrelation. To overcome the phenomenon of autocorrelation error, the team used the general least squares (GLS) estimation method to overcome. The results summarize the impact of factors on the two models as follows:

**Table 8: Summary of regression results according to GLS . model**

	ROA		ROE	
	Beta	P-value	Beta	P-value
ASSETS	0.0571348	0.005	0.0946256	0.004
GROWTH	-0.0005256	0.047	0.0022079	0.036
LIABILITY	-0.0126887	0.571	0.1018911	0.059
INVEN	0.0000786	0.034	0.000201	0.027
RECEIVE	0.0093274	0.002	0.0159293	0.001

(Calculated from Stata 17)

- Test the model’s estimated hypotheses:

The results of the research model have the following equation:

$$ROA = -0.3460704 + 0.0571348 \log(ASSETS) + 0.0000786INVEN + 0.0093274RECEIVE$$

The variable ASSETS has a positive effect of 0.0571348 to ROA and is statistically significant at the 5% level of significance

The variable INVEN has a positive effect of 0.0000786 to ROA and is statistically significant at the 5% level of significance

The variable RECEIVE has a positive effect of 0.0093274 to ROA and is statistically significant at the 5% level of significance

With the collected data set, the remaining variables are not statistically significant at the 5% significance levels.

The results of the research model have the following equation:

$$\text{ROE} = -0.6066743 + 0.0946256 \log(\text{ASSETS}) + 0.01018911\text{LIABILITY} + 0.000201\text{INVEN} + 0.0159293\text{RECEIVE}$$

The variable ASSETS has a positive effect of 0.0946256 to ROE and is statistically significant at the 5% level of significance

The variable LIABILITY has a positive effect of 0.1018911 to ROE and is statistically significant at the 10% level of significance

The variable INVEN has a positive effect of 0.000201 to ROE and is statistically significant at the 5% level of significance

The variable RECEIVE has a positive effect of 0.0159293 to ROE and is statistically significant at the 5% level of significance

With the collected data set, the remaining variables are not statistically significant at the 5% and 10% significance levels.

Out of the 5 variables included in the model, 4 variables explain the level of impact on business efficiency through the dependent variable ROA and 5 variables explain through the dependent variable ROE, specifically:

Impact of variable ASSETS - enterprise scale: The regression coefficient of ASSETS has a positive impact on ROA and ROE. When ASSETS increase by 1, the ROA and ROE of the enterprise increase by 0.0571348 and 0.0946256 respectively, given that other factors remain constant. The results show that enterprise scale can bring good signals to business efficiency, but the external impacts on this indicator have multi-dimensional effects on the benefits that enterprise scale brings. Therefore, enterprises should adopt appropriate policies to build a suitable scale and adapt to the impacts from the market.

Impact of variable GROWTH - enterprise growth rate: The original hypothesis was that GROWTH would have an impact on ROA and ROE, but the results of applying the regression model demonstrate that, in contrast to the original hypothesis, GROWTH had no impact on ROA and ROE. The analysis shows that during the period of 2017-2021, the seafood industry was affected by the EU's IUU yellow card as well as the impact from Covid-19, leading to a decrease in the business growth rate and a negative impact on business efficiency.

Impact of variable LIABILITY - debt ratio: The regression result shows that LIABILITY only affects ROE. When LIABILITY increases by 1, the ROE of the enterprise increases by 0.1018911, given that other factors remain constant. However, an increase in LIABILITY does not necessarily mean that ROE will increase accordingly, as when the debt ratio of the enterprise increases beyond the optimal level, it will have a negative impact on business efficiency.

Impact of variable INVEN - inventory turnover cycle: The regression coefficient of INVEN has a positive impact on ROA and ROE. When INVEN increases by 1, the ROA and ROE of the enterprise increase by 0.0000786 and 0.0159293 respectively, given that other factors remain constant. Although it has a positive impact on business efficiency, the level of impact is very small, which is suitable for the economic context of the period 2019-2021 when the global supply chain was disrupted due to the pandemic, and seafood enterprises were significantly affected as the costs associated with preservation and transportation of inventory increased, leading to a decrease in inventory turnover cycle and a decrease in business efficiency.

Impact of variable RECEIVE - accounts receivable turnover cycle: The regression coefficient of RECEIVE has a positive impact on ROA and ROE. When RECEIVE increases by 1, the ROA and ROE of the enterprise increase by 0.0093274 and 0.0143314 respectively, given that other factors remain constant. In other words, the better the enterprise manages its receivables, the higher its business efficiency. Enterprises that manage their customer receivables well and apply reasonable sales policies will reduce their average collection period, thereby avoiding a shortage of capital for production investment and improving their business efficiency.

**Table 9: Summary of hypotheses testing**

Factor	Variable	Hypothesis	Result	
			ROA	ROE
Enterprise size	ASSETS	+	+	+
Business growth	GROWTH	+	Meaningless	Meaningless
Capital structure	LIABILITY	+/-	Meaningless	+
Inventory management	INVEN	+/-	+	+
Receivables administration	RECEIVE	+/-	+	+

• **Solutions:**

Firstly, in order to ensure production and business efficiency of enterprises as well as improve their attractiveness to investors, a reasonable capital structure must be established. The study’s findings showed that there is a positive correlation between debt levels and firm performance, meaning that as debt levels rise, so do the performances. Therefore, it is necessary to create a fair capital structure in order to secure the production and business efficiency of firms as well as increase their investor appeal. Fishery companies need to have a specific plan in using their capital reasonably to avoid excessive debt (>50%) or abuse of leverage. To do that, they need to identify and find funding sources: seek funding from the government, use other capital mobilization channels such as raising capital from share issuance activities. stocks and bonds for existing shareholders, for strategic partners or for public issuance on the stock market. This is an effective form of capital mobilization because businesses can both raise capital in large quantities and increase the owner’s equity. Companies can also improve their operational efficiency by increasing labor productivity, optimizing production processes and saving production costs. This will help increase the competitiveness of businesses and also help improve their capital structure. In addition, businesses also need to use assets effectively: handle tasks such as recovering debts from other units, releasing unexpected inventory, etc.

Secondly, effective credit practices are essential for fishery companies to effectively manage their receivables. The following factors are needed to establish a customer’s credit profile: customer information, transaction time, financial capacity indicators for customers, details on due dates for timely and late payments, debt turnover, etc.; bolster debt collection by assigning people to keep track of receivables to ensure that payments are made on time and to inform clients of due dates for repayment, etc.; Use the following metrics to assess the success of periodic receivables management: average collection period of businesses in the same industry or industry average; average collection period in the past; In order to track debts swiftly and precisely, firms need to spend money on debt management software.

Thirdly, to reduce the risk to their business, fishery businesses must categorize their inventory in a logical and scientific way. Liquidate inventory with a low turnover rate, reduce inventory while facing

competition to save costs, resolve the oversupply scenario, and improve product competitiveness in a variety of ways. We should pay more attention to domestic markets and promote exports from multiple markets. For export enterprises, they need to comply with regulations and proactively respond to opportunities and challenges. Domestic enterprises need to engage in healthy competition through product quality, reduce production costs and costs by improving processes and technologies, improve labor levels, and actively enter the international market.

## 5. CONCLUSION

Thus, in general, through the above analysis, it can be seen that the business performance of fisheries enterprises in the period 2017 - 2021 is influenced by the following factors: ASSETS (enterprise size), GROWTH (business growth), LIABILITY (debt ratio), RECEIVE (receivable turnover), INVEN (inventory turnover). Research results indicate that variables of ASSET, INVEN, RECEIVE have positive impact with ROA; ASSETS, INVEN, RECEIVE, LIABILITY have positive impact with ROE. In accordance with the research findings, the authors propose specific recommendations and solutions to improve the business performance of seafood companies listed in Vietnam.

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## THE IMPACT OF ASSET SIZE & STRUCTURE ON FINANCIAL PROFITABILITY OF THE LISTED SECURITIES COMPANIES IN VIETNAM

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*ABSTRACT:* This study investigates the impact of asset size and structure on financial profitability of listed securities companies in Vietnam. The authors have modeled and evaluated the impact of asset size, asset structure factors and the relationship between asset size and structure with financial profitability of 25 securities companies listed in Vietnam in the period of 2017 – 2021. The article states that the size and structure of assets is shown through the phenomenon of the influence of the indicator asset size affecting the same direction as ROE and the long-term asset ratio has an opposite impact on ROE. Moreover, the study also shows that factors such as cost coefficient, growth rate, and inflation also have an impact on the ROE of securities companies.

**Keywords:** asset size, asset structure, long-term assets, ROE,...

### 1. INTRODUCTION

The stock market is one of the most important capital mobilization channels of the market economy in the Vietnam economic renovation. Acting as a financial intermediary to raise capital for businesses and the economy; being an enterprise segment operating in the field of financial investment with self-employed activities with high profitability, etc securities companies can be seen to play a vital role in the stock market. Therefore, improving the profitability of securities companies is a prerequisite for the development of securities companies in particular and the stock market in general. To ensure sustainable profitability for securities companies, management entities must develop an appropriate financial strategy, including the size and structure of assets.

Maximizing financial profitability and benefits of management entities has become the main objective of the establishment and business operation of a securities company. Establishing asset size and asset structure allocation should be taken into proper consideration. An inappropriate size and asset structure can result in financial problems and even lead to decline in the company's ability to operate and its profitability.

Asset size represents the financial capacity of the securities company. The size of assets will determine what business activities the securities company can and can not carry out. A securities company with a large asset size will have more favorable conditions than other securities companies to develop and improve its activities as well as improving its reputation and trust with its customers. The large scale of assets also helps securities companies to innovate, upgrade and apply the most modern equipment to serve their work, thereby helping securities companies to promote profitability in business activities.

Asset structure of securities companies shows the ratio of long-term assets and the ratio of short-term assets to total assets. There are notable differences between each securities company. Securities companies

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that focus on investing in technology and fixed assets will have a higher ratio of long-term assets to total assets. Thereby, which will facilitate securities companies to exercise business activities easier, more convenient and safer. In general, the operation of securities companies requires a large amount of cash to stimulate such business activities as margin, proprietary trading or securities underwriting, thereby increasing short-term assets in securities companies. Besides, the items of short-term loans and receivables also accounted for a large proportion in the securities companies' assets. Loans include margin lending, lending activities to advance proceeds from the sale of customers' securities. Short-Term Notes Receivables include receivables from dividends and interest up to the date of receipt, receivables from services provided by securities companies and other receivables such as prepayments to sellers, investment trusts, etc. Thus, most of the securities companies have a higher ratio of short-term assets than long-term assets, which make the asset structure of securities companies mainly in favor of short-term assets. The change in the asset structure of the securities company will change the business activities of the securities company, thereby impacting on the financial profitability of the securities company.

This study will focus on examining the influence of asset size and structure on financial profitability of listed securities companies in Vietnam in the period 2017 - 2021. This may provide some managerial insights in directing the organizational structure of securities companies.

The remainder of this paper is organized as follows: Section 2 reviews the previous literature and develops hypotheses. Section 3 presents data and methodology, while Section 4 presents experimental results and discussion. Finally, conclusions are drawn in Section 5.

## **2. RESEARCH OVERVIEW AND THEORETICAL FRAMEWORK**

### **2.1. Study overview:**

In the world as well as in the country, there have been studies analyzing the impact of the size and structure of assets on the profitability of enterprises in general and enterprises in the securities industry in particular.

Sivathaasan and his associates (2013) conducted a study on the factors affecting the profitability of all manufacturing companies listed on the Colombian and Sri Lankan stock exchanges from 2008 to 2012. Influential factors include asset structure, capital structure, company size and growth rate; The dependent variables representing the profitability of the business are ROE and ROA. The study showed that the independent variables explained 76.6% and 84.7% for the level of influence of the factors on the growth of ROA and ROE of the enterprise. In which, only capital structure has a positive impact on profitability of companies, the variables of asset structure, company size and growth rate have no statistically significant relationship with ROE and ROA.

Bolek & Wiliński (2012) studied the impact of internal and external economic factors on the profitability of construction companies listed on the Warsaw Stock Exchange in the period from 2000 to 2010. Research results have shown that asset size and GDP growth rate have a positive impact on the profitability of enterprises, while asset structure, capital structure, collection period. Average and quick ratio have the opposite effect.

Hang and Linh (2020) research for 27 typical real estate companies listed on HOSE from 2010 to 2019. The obtained results show that asset structure has a negative impact on corporate profits. On the contrary, many factors such as financial leverage, business size have a positive impact on the profitability of real estate companies.

Ngoc and authors (2020) studied the factors affecting the profitability of 20 oil and gas companies listed in Vietnam from 2014 to 2018 and showed that the size and total asset turnover had a positive impact

on the profitability. profits of enterprises in Vietnam’s oil and gas industry. While financial leverage has the opposite effect on corporate profits; remaining, net profit, debt ratio and expense ratio are not significant.

**2.2. Theoretical basis**

Based on theories and empirical studies, the authors conduct an empirical investigation of the influence of size and asset structure on financial profitability of listed securities companies in Vietnam in the period of time. 2017 – 2021. Therefore, it is hypothesized that: size and structure of assets have a relationship with financial profitability of listed securities companies in Vietnam.

To analyze the impact of size and asset structure on the profitability of securities companies, the model is built as follows:

$$Model: ROE_{it} = \beta_0 + \beta_1(Hn)_i + \beta_2(Htsdh)_i + \beta_3(SZ)_i + \beta_4(Gro)_i + \beta_5(Hcp)_i + \beta_6(INF)_i + \beta_7(GDP)_i + e_i$$

**Table 1: The table of defining measurement variables and expected signs**

Variable name	Definition	Proxies	Expected sign
Dependent variable			
ROE	Return On Equity	Net income/Shareholders’ Equity	
Control variables			
SZ	Enterprise size	The Logarithm of Total Assets	+
Hn	Debt ratio	Total Debt/Total Asset	+
Htsdh	Long-term asset ratio	Total long-term asset/Total asset	+
GRO	Enterprise Revenue Growth rate	Increase in the total Revenues/Total Revenues from the prior year’s	+
Hcp	Cost ratio	Total cost/Total revenue	-
GDP	Gross domestic product	Growth in gross domestic in 2017 - 2022	+
INF	Inflation rate	The annual inflation rate in 2017 - 2022	-

*Source: The Author’s team*

**3. DATA AND METHODOLOGY**

**3.1. Data collection**

For this study, the authors will focus on the impact of size and asset structure on financial profitability of listed securities companies in Vietnam. This study includes data of 25 securities companies listed in Vietnam over a period of 5 years (from 2017 to 2021) collected from the company’s audited financial statements. The final sample includes 25 firms with 125 observations.

**3.2. Data analysis**

The authors used STATA 16.0 software to estimate the regression equation that the authors proposed above. First, the two-way relationship between the variables was found through the correlation test. Next, the authors use ordinary least squares (OLS) to test the influence of independent variables on financial profitability. Hausman’s test is then used to discover which model fits the dataset better between the Fixed Effects Model (FEM) and the Random Effects Model (REM). The results show that the REM is consistent with the characteristics of the data in this study. The study also considers some necessary tests for the regression assumption to ensure that the regression results are blue, such as first-order autocorrelation, multicollinearity and heteroscedasticity.

Finally, to validate the author’s research results, REM regression was performed to recalculate the standard errors in case the models violate the regression assumptions.

## 4. RESULTS AND DISCUSSION

### 4.1. Description of stats

**Table 2: Descriptive statistics table of variables**

Variable	Obs	Mean	Std. Dev.	Min	Max
Firm	125	13	7.240121	1	25
Year	125	2019	1.419905	2017	2021
ROS	125	.2297136	.6405785	-3.6302	4.1203
ROA	125	.0687704	.0895524	-.1315	.5561
ROE	125	.1178608	.1229283	-.17	.6216
Hn	125	.3296224	.2538388	.0034	.8457
Htsdh	125	.0861888	.1170152	.005	.6006
SZ	125	14.3374	1.299701	11.9005	17.5742
Gro	125	.6866567	1.725797	-.9964	15.4809
Hcp	125	.7702864	.6405785	-3.1203	4.6302
INF	125	.02986	.0063724	.0184	.0354
GDP	125	.052782	.0208275	.0258	.07076

From the statistics table, it can be seen that the dependent variable ROE has an average of 0.1179, the lowest is -0.17 and the highest is 0.6216, showing that the financial profitability of listed securities companies in Vietnam has a significant difference. big fluctuations. In general, from 2017 to 2021, these financial profitability statistics show that

*Source: Analysis results of the author's team using STATA 16.0*

securities companies are profitable and stable. This comes from the fact that in 2017, the stock market recorded a record increase of 48% over the same period. In the period of 2020 - 2021, overcoming difficulties caused by the impact of the Covid-19 epidemic, the stock market has set a record in terms of scores, liquidity, number of new accounts opened... scale and quality, with excellent business results of many securities companies, including VPS, VND,... Financial statements of 10 leading companies in brokerage market share on Ho Chi Minh Stock Exchange (HoSE) have one thing in common: both revenue and profit have set records since their inception. Stock brokerage and margin lending are still the two main pillars helping companies record double- or even triple-digit growth year-over-year.

The Asset Size variable (SZ) has an average value of 14.3347, the highest value is 17.5742, the lowest value is 11,9005. The distance between the maximum and minimum values is not too large. It can be seen that listed securities companies have quite large assets, by the end of 2021, the asset size of 25 securities companies reached 211,821 billion VND. Large scale of assets concentrated in a few securities companies such as SSI, VND, HCM,... It can be seen that there is an imbalance in asset size among Vietnamese securities companies, mainly small-scale securities companies. That is one of the limitations and also a disadvantage for Vietnamese securities companies in improving business performance. This will significantly affect the ability to generate profits and improve business performance of securities companies. Therefore, for small-scale securities companies, it is necessary to have measures to improve the operation scale by increasing their own capital, merging with large securities companies.

The variable Long-term Asset ratio (Htsdh) averaged 0.0862, the highest value was 0.6006, the lowest value was 0.005. This shows that the majority of securities companies do not invest much in Long-term Assets but invest more in Short-term Assets. It proves that the proportion of Short-term Assets tends to increase gradually over the years, in line with the business characteristics of the market, increasing the

liquidity for the assets of securities companies. According to the author’s calculation, companies such as SSI, BSI, etc. have a higher than average ratio of assets (7.84%). This shows that most securities companies focus on investing in Short-term Assets instead of Long-term Assets, the ratio of Long-term Assets to total assets is very low. Moreover, securities companies with small asset size have a higher ratio of Long-term Assets to total assets than securities companies with large assets.

**4.2. Check for multicollinearity**

**Table 3: The table of the correlation**

```
. pwcorr ROE Hn Htsdh SZ Gro Hcp INF GDP
```

	ROE	Hn	Htsdh	SZ	Gro	Hcp	INF
ROE	1.0000						
Hn	0.3307	1.0000					
Htsdh	-0.2598	-0.4082	1.0000				
SZ	0.4592	0.7337	-0.2813	1.0000			
Gro	0.2797	-0.0848	0.1470	-0.1432	1.0000		
Hcp	-0.6049	-0.0614	0.0133	-0.1834	-0.0943	1.0000	
INF	-0.2818	-0.1385	0.0393	-0.2354	-0.1891	-0.0153	1.0000
GDP	-0.2721	-0.1496	-0.0082	-0.2342	-0.0984	0.1205	0.6081

	GDP
GDP	1.0000

From the results of the correlation analysis, in general, most of the variables in the model have a low level of correlation with each other (less than 0.5). According to the above table, there are SZ and Hn; INF and GDP being correlated. So to cure disability, remove SZ and GDP from the model. However, to confirm

*Source: Analysis results of the author’s team using STATA 16.0*

that when removing the two SZ and GDP variables, there is no multicollinearity phenomenon, the authors will test the multicollinearity phenomenon through the variance inflation factor (VIF).

**Table 4: The VIF test table**

```
. vif
```

Variable	VIF	1/VIF
SZ	2.47	0.405370
Hn	2.45	0.407405
INF	1.73	0.578855
GDP	1.66	0.604014
Htsdh	1.23	0.813059
Gro	1.12	0.889080
Hcp	1.10	0.909167
Mean VIF	1.68	

Based on the table, it shows that the average VIF of the variables in the model is 1.68, less than 10 and there is no independent variable whose VIF index exceeds 10, so there is no strong multicollinearity in the model.

*Source: Analysis results of the author’s team using STATA 16.0*

*Conclusion:* With the standard variance inflation factor VIF, multicollinearity does not exist in the regression model.

4.3. Selecting a regression model

Table 5: The OLP model regression results

```

. reg ROE Hn Htsdh SZ Gro Hcp INF GDP

Source |           SS           df           MS           Number of obs =       125
-----|-----
Model | 1.18314165           7           .169020235       F(7, 117) =       28.63
Residual | .690668531         117           .00590315       Prob > F =       0.0000
Total | 1.87381018         124           .015111372       R-squared =       0.6314
                                           Adj R-squared =    0.6094
                                           Root MSE =       .07683

ROE | Coef.   Std. Err.   t   P>|t|   [95% Conf. Interval]
-----+-----
Hn | -.010663   .0425853   -0.25   0.803   -.095001   .073675
Htsdh | -.216852   .0653924   -3.32   0.001   -.3463583   -.0873458
SZ | .0305263   .0089338   3.66   0.000   .0140133   .0470392
Gro | .0196955   .00424     4.65   0.000   .0112983   .0280927
Hcp | -.099234   .0112963   -8.78   0.000   -.1216058   -.0768622
INF | -2.702843   1.423129   -1.90   0.060   -5.521276   .1155903
GDP | -.1578287   .4262564   -0.37   0.712   -1.002007   .6863499
_cons | -.1456495   .1268126   -1.15   0.253   -.3967952   .1054962
    
```

Table 6: The FEM model estimation

```

Fixed-effects (within) regression      Number of obs =       125
Group variable: Firm                  Number of groups =     25

R-sq:                                  Obs per group:
    within = 0.5418                     min =           5
    between = 0.7289                     avg =           5.0
    overall = 0.5928                     max =           5

corr(u_i, Xb) = 0.2687                  F(7, 93) =           15.71
                                           Prob > F =           0.0000

ROE | Coef.   Std. Err.   t   P>|t|   [95% Conf. Interval]
-----+-----
Hn | -.0340398   .0764602   -0.45   0.657   -.1858746   .117795
Htsdh | -.1654925   .1243711   -1.33   0.187   -.4124688   .0814838
SZ | .0156559   .0254528   0.62   0.540   -.0348882   .0662001
Gro | .0188927   .0047543   3.97   0.000   .0094517   .0283337
Hcp | -.0891333   .0124686   -7.15   0.000   -.1138936   -.0643731
INF | -3.188745   1.556491   -2.05   0.043   -6.279627   -.0978624
GDP | -.3690093   .4713915   -0.78   0.436   -1.305059   .5670808
_cons | .0892576   .393176   0.23   0.821   -.691512   .8700272

sigma_u  = .04858131
sigma_e  = .07333585
rho      = .30499547 (fraction of variance due to u_i)

F test that all u_i=0: F(24, 93) = 1.48      Prob > F = 0.0960
    
```

Table 7: The REM model estimation

```

Breusch and Pagan Lagrangian multiplier test for random effects

Hn[Firm,t] = Xb + u[Firm] + e[Firm,t]

Estimated results:
-----+-----
Var      sd = sqrt(Var)
-----+-----
Hn | .0644341 | .2538388
e  | .0097866 | .0989275
u  | .0205191 | .1432447

Test:  Var(u) = 0
       chibar2(01) = 97.87
       Prob > chibar2 = 0.0000
    
```

Table 8: The Hausman test results

```

. hausman fem rem

-----+-----
Coefficients
(b)      (B)
fem      rem      Difference      sqrt(diag(V_b-V_B))
-----+-----
Hn | -.0340398 | -.0122989 | -.0217409 | .0598137
Htsdh | -.1654925 | -.2116283 | -.0461358 | .1001494
SZ | .0156559 | .0306846 | -.0150286 | .0236001
Gro | .0188927 | .0195409 | -.0006481 | .0021641
Hcp | -.0891333 | -.0962655 | -.0071322 | .0055716
INF | -3.188745 | -2.676409 | -.5123361 | .7697167
GDP | -.3690093 | -.1754384 | -.1935709 | .2411202

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test:  Ho: difference in coefficients not systematic

       chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
       = 2.07
       Prob>chi2 = 0.9561
    
```

Source: Analysis results of the author's team using STATA 16.0

From the regression results of the OLS model, there are 5 statistically significant variables, including: Htsdh, SZ, Gro, Hcp, INF being significant at  $\alpha=10\%$  and Hn and GDP being not significant. In which, Htsdh, Hcp and INF have the opposite effect on ROE; specifically, when the variables Htsdh, Hcp, INF increase by 1 unit, the ROE decreases respectively by 3.32; 8.78; 1.9 units and vice versa. The variables SZ, Gro have a positive effect with ROE, that is, when asset size and revenue growth increase, ROE increases.

From the results of FEM model estimation, with 10% significance level ( $\text{Prob} > F = 0.096 < 0.1$ ), the FEM model is more suitable than POOL OLS and REM model estimation results. With 10% significance level ( $\text{Prob} > F = 0.0000 < 0.1$ ), the REM model is more suitable than POOL OLS.

Thus, according to the Hausman test results, with the significance level of 10%, with the hypothesis  $H_0$ : the difference between the coefficients of the REM and FEM models is not systematic, the REM model is more suitable. ( $\text{Prob} > \text{chi}^2 = 0.9561 > 0.1$ ). From the above test results, the authors choose the REM model to regress the variables.

4.4. Analysis of regression results according to REM model

For the study sample of the authors, the assumption was also the same as the formal test. The authors test for possible violations such as variable variance, autocorrelation,... Hypothesis  $H_0$  is that there is no first order autocorrelation and no phenomenon of variable variance. change, the tested REM model has no

first order autocorrelation and variable variance phenomenon. This proves that the REM estimation model is completely capable and suitable.

**Table 9: The regression results according to REM model**

Random-effects GLS regression		Number of obs =	125
Group variable: Firm		Number of groups =	25
R-sq:		Obs per group:	
within = 0.5387		min =	5
between = 0.7682		avg =	5.0
overall = 0.6313		max =	5
corr(u_i, X) = 0 (assumed)		Wald chi2(7) =	178.50
		Prob > chi2 =	0.0000

ROE	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Hn	-.0122989	.0476286	-0.26	0.796	-.1056492	.0810514
Htsdh	-.2116283	.0737445	-2.87	0.004	-.3561649	-.0670916
SZ	.0306846	.009533	3.22	0.001	.0120003	.0493688
Gro	.0195409	.0042332	4.62	0.000	.011244	.0278377
Hcp	-.0962655	.0111546	-8.63	0.000	-.118128	-.0744029
INF	-2.676409	1.352849	-1.98	0.048	-5.327944	-.0248736
GDP	-.1754384	.4050568	-0.43	0.665	-.9693351	.6184583
_cons	-.1498705	.142833	-1.05	0.294	-.4298181	.1300771
sigma_u	.02739671					
sigma_e	.07333585					
rho	.12246911	(fraction of variance due to u_i)				

Source: Analysis results of the author's team using STATA 16.0

From the estimation results, the efficient regression model shows that the only two variables Hn and GDP are not statistically significant at the 10% significance level. The regression model measures the impact of factors on the financial return (ROE) of securities companies as follows:

$$ROE = - 0,1456 - 0,2116 * Htsdh + 0,3052 * SZ + 0,0197 * Gro - 0,0992 * Hcp - 2,703 * INF + e$$

Thus, it can be seen that while the variable SZ has a positive relationship with ROE, the variable Htsdh has a negative relationship with ROE. This result is consistent with the study Bolek & Wiliński (2012), Hang and Linh (2020),... With a good market development period like 2020 - 2021, it is appropriate to invest in long-term assets. However, until the market shows some signs of risks such as liquidity risk, risk from proprietary trading portfolio, risk from credit control implemented by the State Bank,... The redistribution of asset structure, especially long-term assets, will help the company avoid unnecessary expenses. Therefore, in order to increase ROE, securities companies must increase their asset size, but they need to pay attention to the ratio of long-term assets to total assets. Growth of the VN30 index also has a positive effect on ROE, that is, when the stock market operates effectively, the VN30 index grows well, and the ROE of securities companies also increases. This is completely appropriate because the growth of VN30 proves that the stock market operates effectively, including the contribution of securities companies.

**5. CONCLUSION AND RECOMMENDATIONS**

This study examines the impact of asset size and structure on financial profitability through a sample of 25 listed securities companies in Vietnam for the period 2017 - 2021. The study shows that the asset structure measured by the ratio of long-term assets to total assets has a strong negative impact on a firm's ROE. Furthermore, the asset size is shown to have a positive effect on ROE while cost coefficient and inflation rate negatively affect the ROE of the company. Some limitations of this study that should be commented on are as follows: the data set used in this analysis is not sufficient to generalize the results to all securities companies in Vietnam; various profitability ratios and size variables and long-term asset ratios can be used to confirm these findings; time delay is not considered..

Regarding the proposed solution, Vietnam's stock market is rapidly developing, and many new products have been launched into the market. Therefore, to be able to provide these products, securities companies need to increase the size of their assets to improve their financial potential. In addition, securities companies also need to carefully control the ratio of short-term assets, long-term assets in their asset structure according to market fluctuations and in accordance with the company's industry characteristics, creating efficiency. business activities, improve financial profitability for securities companies.

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## THE IMPACT OF THE SILICON VALLEY BANK COLLAPSE AND LESSONS LEARNED FOR VIETNAMESE BANKING SYSTEM

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*ABSTRACT: A commercial bank is one of the financial institutions that plays a leading role in the national economy, undertaking important functions such as credit intermediary, payment intermediary, money creation and provision of banking services for economic entities. With that important role and position, the inefficiency of a bank leading to bankruptcy will have a huge impact on the entire national financial system, even global economic activity. From the bankruptcy of Silicon Valley Bank (SVB) in early 2023, we can see its negative impacts on the US economy as well as the world, and draw many valuable lessons for banks operating in Vietnam.*

**Keywords:** Silicon Valley Bank (SVB), bankrupts

### 1. INTRODUCTION

The banking system plays an important role in supporting the economic and financial development of a country. However, the collapse of a bank can create significant negative impacts on the global banking system and have far-reaching effects on the economy and society. A prominent example is the collapse of Silicon Valley Bank, a financial technology bank widely known for its global influence.

Silicon Valley Bank (SVB), the 16th largest bank in the US, suddenly went bankrupt after only 48 hours, causing the entire US banking industry to suffer, plunging the nation's financial foundations into a serious crisis since the collapse of Washington Mutual. The impact of the SVB collapse was not limited to the national level, but also caused instability in the global financial system.

Vietnam's banking sector has witnessed stability and growth in business activities. Vietnamese banks have improved the quality of risk management, improved capital capacity and improved the quality of financial services. This has created trust from domestic and international customers and investors. Along with the achievements are difficulties and challenges that Vietnam's banking industry needs to overcome.

This article will conduct an assessment of the impact of the collapse of the Bank of Silicon Valley, further analyzing the causes of the bank's collapse, its impact on the global banking system and the socio-economic consequences it has caused. From there, recognize weaknesses and challenges, and propose specific lessons learned and solutions to overcome for Vietnam's banking industry can enhance stability and reliability in business operations, from risk management to internal control and international cooperation.

This article is not only important for banking professionals and managers, but also contributes to building a strong and reliable banking system for Vietnam, while creating the basis for the sustainable development of the economy.

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## 2. CONTENTS

### 2.1. Silicon Valley Bank and its bankruptcy

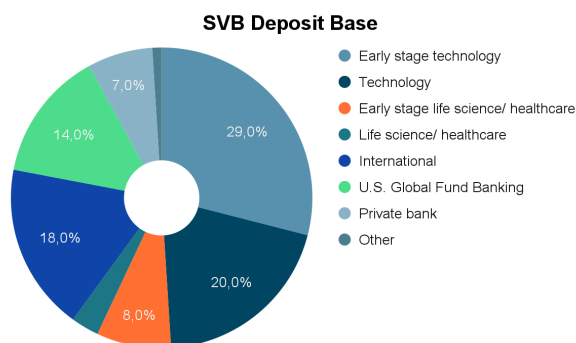
#### 2.1.1. Overview of Silicon Valley Bank (SVB)

Silicon Valley Bank (SVB) is a privately held commercial bank and financial services company serving the technology, health sciences, and innovation industries. SVB was founded in 1983 and is headquartered in Santa Clara, California. SVB provides various banking and financial services to startups, venture capitalists, private equity firms, investors and high net worth individuals.

SVB has an important role to play in accelerating the growth of the technology industry and startups in Silicon Valley and globally. With many years of experience working with startups and intermediaries, SVB understands the needs well. finance and challenges that new businesses create, thereby becoming a bridge to help businesses access capital easily and quickly. The two main roles of SVB can be mentioned as:

**Firstly, providing financial services to technology companies, supporting startups and startups.**

SVB is one of the leading banks in the US providing financial services to technology businesses, including loans, payment services, deposit management and personal finance solutions. SVB has provided more than \$30 billion in loans to more than 5,000 startups since 1983. This makes it possible for start-up companies to grow and expand operations, create new products, services and create jobs. Not only that, SVB also provides special financial solutions for startups, helping them to start and grow their businesses. Looking at the chart, it can be seen that up to 29% of deposits in SVB are from early-stage technology companies, 20% from technology and from many other sources such as healthcare, international, private banks...



Source: <https://seekingalpha.com/>

**Secondly, SVB is a source of information, connection and investment consulting support for businesses in the field of start-up technology.**

Thanks to its deep understanding of the technology and startup industries, SVB can provide useful information and advice to investors when evaluating and managing their portfolio. In addition, SVB also regularly organizes events and seminars to connect startups with each other and with investors. Through providing market information and analysis, SVB has helped startups make smart business decisions, helping investors better understand the startup market and this will provide their clients with the most accurate and effective investment advice.

Thus, it can be seen that SVB plays an important role in the economy in general, especially in the fields of technology, start-ups and new investment. In addition, SVB is also one of the key banks in international trade and investment activities, contributing to economic development globally.

### **2.1.2. The collapse of Silicon Valley Bank**

SVB's collapse began on March 7, 2023 when SVB announced that it had sold off \$21 billion in bonds and was expected to sell another \$2.25 billion of shares to balance its balance sheet. This has caused panic among customers as well as investment companies, leading many parties to withdraw their investments from this bank.

On March 9, 2023, SVB's shares collapsed, seriously affecting the stocks of many other banks. Only one day later, SVB shares officially stopped trading, and the bank gave up efforts to contribute capital or find suitable investors. As a result, shares of some other banks such as First Republic, PacWest Bancorp, and Signature Bank were also suspended. Not only that, SVB also faced depositors massively withdrawing \$42 billion in one day (equivalent to  $\frac{1}{4}$  of total deposits at the bank), which rendered the bank illiquid.

As a result, on the morning of March 10, authorities in California closed SVB Bank and handed it over to the Federal Deposit Insurance Corporation (FDIC).

The rapid collapse of SVB was caused in a short time by various factors but stood out:

#### **Firstly, the FED raised interest rates to control skyrocketing inflation.**

When the FED raises interest rates, borrowing costs are more expensive, stock prices fall and the dollar strengthens, and at this time the cost of capital for banks also increases. This reduces the profitability of SVB as they need to pay more to borrow funds from the Fed or other banks.

In the period from 2020 to 2022, SVB has invested heavily in government bonds, corporate bonds and mortgage stocks through home loans in the hope that interest rates will remain low for a long time. However, when the FED raised interest rates quickly to cope with inflation from the beginning of 2022, the value of these investments dropped sharply, being discounted more and leading to losses. The rapid increase in interest rates also makes the investment cash flow into technology companies and startups gradually decrease, forcing them to use deposits at SVB to cover rising costs. SVB was forced to sell these bonds to have money to pay, but the more they sold, the more they lost, so they had to plan to issue more shares to compensate. The unusual increase in demand for equity capital raised concerns for venture capital funds and deposit businesses, so they pulled out in unison.

#### **Secondly, the bank lacks portfolio diversification.**

SVB mainly invests in buying Government bonds with almost zero interest rate and this will lead to interest rate risks, financial risks and liquidity risks. When the interest rate on government bonds is almost zero, the bank will not have a source of profit from this investment portfolio. This may affect the bank's growth and profitability in the future. Not only that, if the bank invests too much in Government bonds, it will become too dependent on the financial stability of the Government. If the Government is in financial difficulty or is unable to repay the loan, the bank can suffer a great financial loss. In addition, government bonds may have low liquidity, which means that banks may find it difficult to quickly convert these investments into cash. The low liquidity of government bonds can be attributed to many factors such as long maturities, low interest rates, or lack of interest from investors. When the liquidity of government bonds is low, banks may find it difficult to buy or sell these investments. This can result in the bank not being able to provide sufficient cash in the event that it is needed, like paying off a debt or responding to a customer's withdrawal request.

**Thirdly, the weakness in risk management along with the inability to predict adverse movements in financial markets.**

Weakness in management caused SVB to collapse because it affected the bank's ability to assess, adjust and manage the risks it was facing. The cause of SVB's bankruptcy is said to be due to its main business activities, which are bond trading and losses. As SVB did not have enough contingency programs, there was not enough profit to cover the losses caused by selling bond-related assets at a loss. Not only that, SVB has been operating for 8 months without a risk manager because Mr. Laura Izurieta resigned as Chief Risk Officer of SVB Financial Group (Silicon Valley Bank's parent company) in April 2022. It was not until January 2023 that SVB appointed a new person to the CRO position, Kim Olson. Silicon Valley Bank has been without a full-time chief risk officer during its tumultuous transition in the venture capital markets. At the beginning of 2022, as interest rates began to rise, venture capitalists retreated and reduced the speed of transactions, leaving the tech companies they backed out of liquidity. That directly affects the deposit at SVB.

**Fourth, Silicon Valley Bank's operating model focuses too much on some high-risk areas.**

Some high-risk sectors such as technology, innovation, and health services - the sectors with the highest concentration of Zombies businesses (those that cannot afford to pay off their debts, cannot stay in business and are tied to banks). Too much focus on such a risky area can reduce an organization's ability to adapt and withstand the unexpected or market changes. One of the characteristics of SVB is that it mainly receives deposits from technology businesses and venture capital funds. These capital sources are not stable, so when needed, businesses and investment funds withdraw to pay their maturing obligations.

**Fifth, the number of people withdrawing cash increased dramatically, causing the bank to become illiquid.**

To balance finance, on March 8, SVB announced to sell a series of bonds with huge losses, even selling \$2.25B of new shares. This caused venture capital firms to start worrying and advising clients to withdraw funds urgently. As a result, SVB faced massive customer withdrawals of \$42 billion in one day, equivalent to 25% of the bank's total deposits and this made the bank insolvent.

## **2.2. The impact of the Silicon Valley bank collapse**

### **2.2.1. For the US:**

**Firstly, the collapse of SVB signals the failure of the Fed to regulate the banking sector.**

In its report released on April 28, The Federal Reserve Board (Fed) acknowledged that it "did not fully appreciate the extent of the vulnerabilities as Silicon Valley Bank grew in size and complexity". Accordingly, SVB's management did not take appropriate risk management measures before the bank's rapid collapse. While Fed supervisors have also failed to see signs and signs of a slowdown in SVB operations, they "did not take sufficient steps" to prevent an eventual collapse.

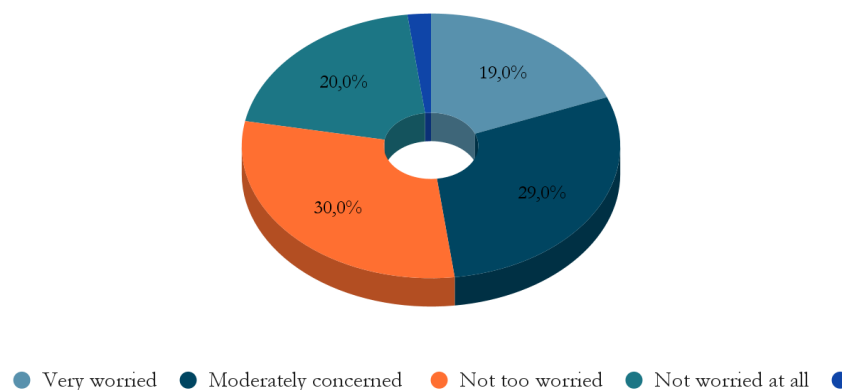
The collapse of SVB raises questions about the Fed's ability to respond to and adapt to the rapid transformation and development of the technology and financial industries. It also points to the Fed's shortcomings in anticipating and preventing potential risks in the banking system. Wrong decisions cause gaps and risks to remain in the banking system, including: Liquidity risk, concentration risk, interest rate risk... aggravated. As a result, just 2 days later, Signature Bank (SB) declared bankruptcy. 2 months later, First Republic Bank became the next bank to declare bankruptcy in 2023 in the US. This can be considered as a serious failure of the Fed in regulating the banking industry.

**Secondly, the collapse of SVB bank created many negative effects on the US socio-economy**

As America's 16th largest bank with total assets of up to 209 billion USD, SVB's bankruptcy has created many negative impacts on the US socio-economy:

One of the most negative effects is the loss of confidence of people and investors in financial markets. With the successive collapses of a series of large banks such as Silicon Valley Bank (SVB), Signature Bank (SB), First Republic Bank, customers as well as investors are gradually more concerned about the stability of the banking system and the safety of investments in other banks. A Gallup survey, which followed the collapse of SVB and Signature Bank but predated the failure of First Republic, has found that: Of the 1,013 survey participants, up to 48% of adults were concerned about their money being in banks. It can be seen that the continuous bankruptcy of large banks and financial institutions is making the American people increasingly lose confidence in the banking industry, indirectly losing people’s confidence in the policies of the Fed and the State: Only 36% of people trust the Fed chairman’s leadership — the lowest number in 20 years (according to the most recent Gallup survey)

**The level of people worried about the safety of bank deposits**



**Source: Made by Author, data from Gallup**

Another negative effect of this case is that technology companies and startups lose credit and face many financial difficulties: For SVB-invested startups, bankruptcy means liquidating the fund’s remaining assets, which will include shares of many startups that SVB has invested in. If liquidated by investment funds holding high-value shares, this will have an adverse impact on the company’s capitalization and brand value. Worse, this will impact the private equity market, causing a negative impact on idle funds. Meanwhile, cash flows in the market will be backlogged without creating any surplus value for investors. On the other hand, SVB is also acting as one of the important banks for technology businesses and startups. Therefore, SVB’s bankruptcy has created many difficulties in accessing capital and financial services.

Deposits are also one of the aspects affected by SVB’s bankruptcy. Of SVB’s \$209 billion in assets, most of them are venture capital investments and many deposits are not insured by the Federal Deposit Insurance Corporation (FDIC). The collapse of SVB left billions of deposits of many companies and investors “trapped”. Deposits not covered by FDIC (over \$250,000) may be transferred to another bank or liquidated, and customers may have to pay back their debts according to a schedule set by the courts and legal regulations. In the worst case, depositors are likely to lose all of their money. This led to the presence of a domino effect on withdrawals and sell-offs in bank stocks.

From these effects came a serious social consequence: Increased unemployment. SVB is an important sponsor and job provider in the technology industry. However, the collapse of SVB caused the companies’ deposits to be frozen, which affects the company’s business activities. On the other hand, the salaries of tech

workers paid through SVB have problems paying. Many of them were either laid off by the company with the aim of downsizing costs, or agreed to quit, rather than wait until the money was paid. The bank's collapse could lead to job losses and increased unemployment in the tech industry, affecting the U.S. economy.

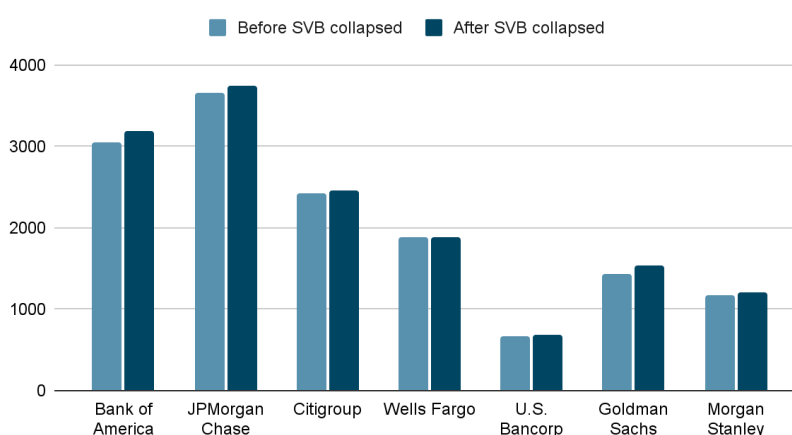
**Thirdly, the collapse of SVB has stunned the U.S. banking industry after years of trying to maintain stability.**

Earlier, to curb inflation, the Fed has continuously raised interest rates, most recently raising the rate to 4.5%-4.75%, expecting to raise the rate to 5.25%-5.5%. High prices cause the value of investments to fall while borrowing costs rise, making investors suspicious of bank loans and banks lose a group of potential customers.

After SVB Bank's bankruptcy and the continued bankruptcy of other large banks, many people are concerned about deposit safety, leading to a domino effect on withdrawals at banks, especially at small and medium-sized banks. According to Fed statistics, since SVB's bankruptcy announcement, deposits in small banks have decreased from \$119 billion to \$5.46 trillion as of March 15. Deposits in major banks such as JPMorgan Chase, Wells Fargo and Bank of America also fell at their lowest levels in a decade (down \$61 billion in the first quarter of 2023 and down \$521 billion same period last year).

The loss of potential customers as well as the domino effect of withdrawing deposits spread illiquidity in banks. Followed by the continuous "plunge" of bank stocks or financial institutions, typically such as: Wells Fargo & Co down 6%, JPMorgan Chase & Co down 5.4%, Bank of America Corp down 6% and Citigroup Inc down 4% (ending the trading session on March 10); Bank Of America shares fell more than 16% in March; Shares of PacWest Bank and Western Alliance fell as much as 50% and 38% (at the close of trading on 04/05). The plunge of stock prices, the slowdown of banks (reflected in a very small increase in total assets of banks) and the domino effect of withdrawals persist even after the SVB incident. Although the U.S. government has made many efforts, such as: the U.S. government has guaranteed full payment of deposits at SVB to depositors (including those not covered by the FDIC), it is not enough to control the situation.

**Total asset of banks (CU: 1.000 USD)**



*Source: Made and compiled by the author*

### 2.2.2. For the global economy

The U.S. banking crisis has created a ripple effect, weighing on global bank stocks. Specifically: after the announcement of SVB's collapse, at the trading session on March 14, many banks around the world recorded a decline in share prices: ANZ (Australia) fell more than 2%; STOXX (Europe) closed 5.7% lower; Commerzbank (Germany) fell 12.7%...

Above all, investors are worried about whether a domino effect emanating from the US will appear, bringing down more banks, dragging many other organizations and corporations. Because, SVB is currently the investor of many large companies in the world such as Roblox Corporation, Vimeo, Etsy ... The collapse of SVB will create many negative impacts on many businesses, especially technology businesses and startups. Indeed, declining confidence has sent the crisis to Switzerland, pushing the country's second-largest bank, crisis-ridden Credit Suisse, to the brink of collapse and ending up with a takeover of UBS. In Israel, home to a vibrant high-tech industry, hundreds of tech companies are counting on government assistance to escape bankruptcy due to the SVB affair. Although at the present time, the crisis is gradually under control, investors' confidence has not been able to regain.

On the other hand, the banking crisis from the U.S is a warning to governments and banking systems in risk assessment and policymaking, especially Asian countries - which are considered not to be affected much by the SVB case, including Vietnam.

### **2.3. Reference to the banking system in Vietnam**

#### **2.3.1. Theory of bank's bankruptcy in Vietnam**

In section 4 (2) of the 2014 Law on Bankruptcy which is currently being applied in Vietnam, bankruptcy is understood as "the situation of an enterprise or cooperative becoming insolvent and being declared bankrupt by the People's Court". According to that, a bank can be considered bankrupt in case it falls into insolvency of its due debts and is unable to fulfill its financial obligations to customers.

In the history of Vietnam's banking industry since 1951, there has been no bank that actually fell into bankruptcy. In fact, to bankrupt a bank is not simple and easy, and the consequences of this can last for decades to come. The reason is that the banking system in Vietnam today is very large, holding a huge amount of assets of the whole society; it plays a strong role in promoting investment, developing production and business activities as well as export and import; it is the most important factor in the process of growth and development of the national economy. The banking system has both controlled inflation and stabilized the macroeconomy; while providing capital for the economy. Therefore, the ability of banks to dominate and influence the economy is very strong.

Banks themselves act as financial intermediaries, so they must build high credibility for customers depositing as well as borrowing money. If a bank goes bankrupt, the deposited assets of businesses as well as people cannot be fully recovered. It creates bewilderment, anxiety and fear of a similar scenario for customers depositing money in other banks; makes people lose faith in the system, the market and the management agencies. That will lead to people's sentiments fluctuating and they will simultaneously withdraw money ahead of time in all banks in the country, causing the entire banking system to be overwhelmed and paralyzed. This is the power of the domino effect that causes not only the entire nation's finances to be negatively affected, but also to cause enormous social unrest.

Therefore, in Vietnam, when a bank shows signs of poor performance and creates negative effects, the Central Bank will immediately direct the implementation of measures to save it. Bank bankruptcy is only a last resort, as the Central Bank's previous attempts at disposal were unsuccessful.

To save a bank that is not performing well, the first solution that can be used is to inject more money so that the banks can maintain operations and improve the situation. However, this is an expensive measure. It can cause inflation and is difficult to address the root of the problem. Another popular and commonly used method in Vietnam is bank consolidation, merger and acquisition. The purpose of this is to help weak banks overcome difficulties in bad debt liquidity as well as other limitations and shortcomings. At the same time,

it creates opportunities for big banks to promote and utilize their resources in terms of capital, technology, human resources and market share. The last method to deal with a failing bank is to nationalize the bank. However, this measure is only used when the bank is “too big to fail”, which means there are too many large and intertwined links in the financial system. The direct acquisition of shares of commercial banks will help the Central Bank to actively restructure, ensure deposit payment, and prevent the spread of this bank’s weaknesses to other credit institutions.

### **2.3.2. Bank’s bankruptcy risks drawn from SVB’s case**

Although bankruptcy is almost impossible in Vietnam, its risks do exist and could affect Vietnam’s banking industry at any time. The Silicon Valley Bank (SVB) incident is also an opportunity for the banking industry around the world in general and Vietnam in particular to clearly recognize the major risks that can cause bankruptcy for a bank as well as negatively impact the banking system of a country. It can be said that the collapse of Silicon Valley Bank (SVB) is the result of the resonance of many risk factors that banks always face.

**Firstly**, the bank is subject to macro risks when the government introduces policies to raise interest rates to reduce inflation continuously and inappropriately. The U.S. Federal Reserve (Fed) continuously raises interest rates to reduce inflation, causing not only SVB but also many other banks in the US to fall into a difficult situation.

Banks may have a concentration risk problem when their customers are primarily focused on a specific industry, geography or target group. In SVB’s case, the bank mainly focuses on serving startups and venture capital; focusing on exploiting the market in the Silicon Valley region. That’s like putting all your eggs in one basket, increasing the risk for banks when their main customers are struggling.

**Secondly**, liquidity risk when banks fail to take actions to hedge liquidity risks to overcome cash flow gaps that are often longer than interest rate gaps and allow banks to become insolvent of maturing contracts. The risk that banks can face also comes from the lack of diversification of their portfolios, whether they only buy government bonds at low interest rates or invest in a few key items and make wrong financial decisions.

**Thirdly**, banks may also face risks in their organizational structure. For SVB, the bank has been operating for 8 months from April 2022 to January 2023 without a Chief Risk Officer (CRO), making it difficult for the bank’s risk management capabilities to predict adverse fluctuations in the financial market. Structural risks also emerged in Vietnam’s banking industry in 2014 when Nguyen Duc Kien, former Vice Chairman of Asia Bank (ACB), was arrested for fraudulently misappropriating assets amounting to VND 264 billion and sentenced to 30 years in prison.

**Finally**, the main reason for the collapse of SVB was the sudden increase in the number of people withdrawing cash due to crowd psychology, customers withdrawing 42 billion USD – or 25% of the total deposits of the bank. In Vietnam, in 2022, a similar case occurred that caused Sai Gon Joint Stock Commercial Bank (SCB) to have a mass withdrawal due to the negative information impact from the case of Ms. Truong My Lan who was arrested for fraudulent acts in issuing, buying and selling bonds contrary to the provisions of law. However, thanks to the timely intervention and handling of the Central Bank, SCB then stabilized and operated normally.

## **2.4. Lessons learned for Vietnamese banking system**

### **2.4.1. For the Government of Vietnam**

The Government should have policies to monitor, predict and forecast banking risks such as: Synthesize, analyze and forecast the monetary and financial situation, and propose systematic risk prevention measures. in

the field of money and finance. At the same time, it is necessary to develop policies and measures to respond to the crisis; ensure the stability of the monetary, financial and banking systems. Vietnam has become a prime example of how to handle deposit crises. In October 2022, Sai Gon Joint Stock Commercial Bank (SCB) faced a wave of massive withdrawals. However, the Central Bank intervened and handled the situation, pledging to depositors that their savings would be secured and quickly restoring market order. This quick intervention proves that the Central Bank is well prepared to contain sudden waves of panic, providing much-needed reassurance to customers and investors. Currently, the government has many policies and measures to respond to the crisis and ensure the stability of the monetary system at banks, such as:

- Preferential credit policy: This policy is applied to enhance the borrowing capacity of businesses and individuals, and at the same time create growth momentum for the economy. Specifically, the government can reduce interest rates on capital loans to ease the financial burden of businesses.

- Policy to strengthen management and supervision of banks: The government sets out regulations and policies to strengthen management and supervision of activities of banks. At the same time, strengthen inspection, supervision and strictly handle violations in the activities of banks

The Central Bank needs to consider adjusting and setting reasonable interest rates. As interest rates rise, new loans will become more expensive and it can reduce the need for loans, make existing loans more difficult to repay and increase the risk of default. This may lead to banks having difficulty in finding capital to lend or meet the payment needs of customers. In reality, the Fed's high interest rate hikes can increase funding costs. and put pressure on banks, including SVB. In the case of SVB, this bank has many loans with low interest rates and the interest rate on their customers is not high enough, then the Fed's interest rate increase will reduce this bank's profit and lead to collapse because they did not have enough capital to meet their debts. Through the SVB incident, the government of Vietnam has come up with a number of options to control interest rates at a stable level, including:

- Adjusting interest rates by the Central Bank: The Central Bank can adjust interest rates to control interest rates in the economy. If inflation is high, the Central Bank may raise interest rates to limit price increases. In case of economic recession, the Central Bank may reduce interest rates to increase the borrowing capacity of enterprises.

- Control of the money supply: When the amount of money in the economy increases rapidly, the Central Bank can reduce the money supply to limit price increases. Conversely, if the economy is in recession, the Central Bank can increase the money supply to stimulate production and consumption.

- Good management of debt loans: The government needs to manage debt loans well to limit risks in banks and minimize the negative impact of bad debt on the operation of the economy.

The government needs to pay close attention to, supervise and closely monitor the activities of banks, especially small banks. Banking control is not only carried out in large banks with high risks, but it is necessary to control all banks, because any bank that has problems can also affect the system, and there are always risks that we cannot foresee. When customers feel that a small bank is not safe, they can withdraw money to another bank, but many people rushing to withdraw money can bring down the entire banking system. Therefore, it is important that when a small bank has a problem, the Government needs to quickly control the fire to avoid the fire spreading to the whole banking system.

Each country needs to learn from the experience of other countries in risk management and build a financial safety net, in which it is necessary to pay attention to systemic risks, inter-bank risks, securities securities, real estate and the real economy, it is necessary to have a crisis handling mechanism in place to be able to react quickly, methodically and effectively.



The government needs to take measures to strictly handle those who post false information, confuse people and affect the bank's operations. Posting false and misleading information can cause serious damage to a bank, ranging from loss of customer trust to business operations. The Government needs to ensure that banks operate in a fair, transparent and trustworthy environment. Not only that, posting fake news can also lead to instability, anxiety and panic in the consumer community, which not only affects people's health and spirits, but also directly affects people's health. affect bank operations. The common cause of the banking crisis that occurred at two banks, Sai Gon Joint Stock Commercial Bank and Silicon Valley Bank, was derived from people rushing to withdraw money because they were provoked by false information being spread on the Internet. Learning from the above incident, the government has set out a number of policies to prevent fake news, namely:

- Setting out legal regulations: The Government has promulgated legal regulations to handle acts of creating fake news and spreading false information. For example, the 2018 Law on Cyber Security and the 2016 Press Law contain laws related to the handling of fake news.

- Monitoring and controlling online content: The government has set up authorities to monitor and control online content, in order to detect and handle fake news. Websites and social media accounts that spread fake news will also be handled according to the law.

- Enhancing public education about the importance of preventing fake news, and calling on people to join hands to prevent fake news. Fake news can create confusion, conflict and anxiety in society. When people are taught how to recognize and, through knowledge, prevent fake news, we can reduce the spread of fake news and ensure security and social stability.

#### **2.4.2. For banks in Vietnam**

Banks need strict financial supervision to ensure the stability and reliability of the financial system. If a bank's finances are not properly managed, it can lead to risks such as loss of customers' money, loss of bank assets, and even the collapse of the entire financial system. In addition, financial supervision helps the bank ensure compliance with legal regulations and ethical standards in its operations. Not only that, strict financial supervision also helps banks make the right decisions, improve risk management capacity and ensure liquidity.

Banks should diversify their investment portfolios to minimize risk as much as possible. Diversifying investment portfolios will help banks reduce risk by allocating investments to different asset classes. In addition, portfolio diversification also helps the bank to take advantage of new investment opportunities in different fields, if only investing in a single field, the bank may miss opportunities. Other attractive investments. At the same time, the monitoring, inspection and self-assessment of the business activities of banks also need to take place regularly, so the possibility of a crisis spreading from the collapse of other banks should not be underestimated.

Banks need to verify the health of businesses before granting loans or investments to ensure that businesses are able to repay loans and generate profits, minimizing risks for banks and businesses. The situation of "high investment but fake profit and loss" occurs when a business is assessed beyond its financial capacity, production and management capacity, and then cannot meet its financial needs. investment and bank profits. This is a difficult and dangerous situation for both banks and businesses. Therefore, to avoid risks for both parties, the bank should clearly assess the health of the business

Banks must prepare necessary provisions for long-term investments in the event of bad market conditions. Bank risk can be managed through hedging and buying long-term bonds or other investment instruments that add value to offset losses from bond sales when policy changes.

Banks also need to come up with measures to improve customer confidence because this is a very important factor to maintain the credibility and development of the bank. From the fact that people withdrew their money in a short time and caused a banking crisis at two banks, SCB and Silicon Valley Bank, that confirmed the importance of customer trust to the bank. If banks can offer reasonable and effective customer care and consumer confidence policies, this will be the basis for building trust and also being able to regulate risks. Customers trust the bank, they are willing to trust, invest and cooperate with the bank, thereby helping the bank control risks. According to the evaluation report of the Vietnam Assessment Report Joint Stock Company (Vietnam Report), as of June 2022, Joint Stock Commercial Bank For Foreign Trade Of Vietnam (Vietcombank) is the leading bank in the “Top 10 prestigious commercial banks in Vietnam in 2022”. The fact that Vietcombank is at the top of the table shows that the bank’s efforts in improving customer experience and service have been creating positive effects, and at the same time creating solid trust for customers. products when choosing an investment.

Banks need to invest in technology to enhance customer experience, including updating equipment systems, developing mobile apps, and easy-to-use websites to help customers make transactions. easily and quickly. Besides, banks should build attractive promotions to attract new customers and retain old customers. Promotions may include incentives such as fee reductions, gifts, increased savings rates, lower lending rates, or free services such as Internet Banking, credit cards, and products. other. These promotions can help increase sales and increase customer loyalty, and help banks create better relationships with customers.

#### **2.4.3. For customers**

From the fact that customers rushed to withdraw money, causing a banking crisis, this is even one of the reasons why the 40-year-old bank SVB collapsed in just 48 hours. We can see that it is extremely important for customers to have the right understanding, trust in the bank and the Government’s policies. The common cause for customers of SCB and SVB to withdraw money was determined to be because of unfounded information sources and posts posted on social networking sites about the fact that the two banks are in a bad financial situation. unstable or in danger of bankruptcy. Congressman Patrick McHenry, chairman of the US House of Representatives Financial Services Committee, commented that the SVB riot was the “first Twitter-incited withdrawal surge” and similarly, the incident that sparked the mass withdrawal of money at SCB was also stemmed from false posts on Facebook. These false posts have hit the psychology of consumers and caused a “domino” effect of massive withdrawals of people. Through the incident with the two banks above, it can be seen that, to ensure their legitimate interests, customers need to equip themselves with basic knowledge and have confidence in the bank and the government policies. For example:

- Customers need to improve their own knowledge and awareness and constantly update new knowledge, avoiding believing in fabricated, fraudulent and untrue information. If customers do not have sufficient knowledge or have no confidence in the bank as well as the policies of the Government, they may become the target of fraudsters or will lose their rights. As in the case of SCB, in the face of people rushing to withdraw money, the Central Bank has applied necessary measures for SCB to operate normally and ensure liquidity. For people who are saving money at SCB, Governor Nguyen Thi Hong said that people’s deposits at banks, including SCB, are guaranteed by the Government in all cases. Thus, the fact that customers are constantly updating new knowledge and having trust in banks and the Government not only helps them withstand the “information storm” exploding on social networks but also ensures their rights.

- Customers need to thoroughly understand and understand the bank’s financial products or services, especially risks. This will help customers know the level of risk and understand asset protection policies, so

that consumers can avoid unwanted risks and at the same time make the right decisions for the protection of assets. invest.

- Customers need to closely monitor the activities of the bank they are sending money to to have appropriate solutions, avoid following the crowd to lose their benefits. Monitoring the bank's activities closely also helps clients ensure that their deposits are protected and safe. Depositors can monitor information about security systems, customer protection measures, and compensation mechanisms in the event of a failure.

### 3. CONCLUSION

From the case of Silicon Valley Bank (SVB), we can see its negative and serious impacts on the US economy as well as other organizations around the globe, thereby drawing specific lessons for the banking system in Vietnam. It can be said that commercial banks play a central role in the economic development process not only for Vietnam but also for every country in the world. With this important position, each bank needs to ensure that its operations are well maintained and take specific measures to prevent and prevent risks that may occur under the support of the government, thereby avoiding falling into the situation of weak operation, inefficiency; leading to the risk of bank bankruptcy; causing adverse effects on the banking system in particular and society in general.

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## FINANCIAL SAFETY OF SECURITIES COMPANY IN VIETNAM

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*Abstract: Through the turbulent years of the global economy, financial safety has become a threat to financial institutions around the world, and they are also an inadequacy for the economy and market fledgling financial school in Vietnam. In order to create opportunities for domestic and foreign investors, along with developing the financial system in general and creating opportunities to raise capital for businesses and the Vietnamese government in particular; securities companies have been established and developed a financial safety system in order to protect the interests of investors. The reason for the focus on financial safety at securities companies in Vietnam is to solve the risk management problem when there is a sudden increase in the number of investment accounts in the market, the interests of investors in particular and the race to increase capital and dominate the market of securities companies in Vietnam in general in the last 5 years (2017 - 2021). In this study, we try to overcome it by completing all the evaluation criteria based on collecting written data, business situation, and focusing on a few typical securities companies. this latest study. Our findings also indicate that the lack of leadership and management judgments, and the neglect of issues of sensitivity to market risk, greatly influence the determination of the level of risk financial safety at securities companies in Vietnam.*

*Keywords: financial safety; securities companies; risk management; Vietnam.*

### 1. INTRODUCTION

Ensuring financial safety at securities companies is a prerequisite issue in developing the financial market in Vietnam. The issue of financial safety is not entirely new, but after the financial crisis and economic recession, they have been recognized and given more attention by researchers to control unwanted risks that come from macro and micro issues. Especially, for a nascent stock market like in Vietnam, the Covid 19 pandemic has accelerated the race of corporate investors and individuals, the risk control at securities companies become more and more important, in order to protect the interests and interests of domestic and foreign investors. Based on previous studies, which usually only revolved around ensuring safety and reducing risks at banks, in this study, we focus on the issue of ensuring financial safety at companies securities - the driving force for the development of financial markets. On the contrary, when risk management is poor, the company's financial insecurity will cause business activities to decrease, lose confidence of investors, and the company will easily get entangled in legal problems. Effective financial safety control is the overall management of factors affecting the operation of an enterprise such as: capital norms, asset quality, manageability, profitability, liquidity account, market sensitivity (according to CAMELS model). In this study, we choose the CAMELS model to provide the criteria for assessing capacity, financial position, effectiveness and risk level, which are quantified and applied uniformly to all projects. Banks, financial institutions can carry out the ratings/reviews in many consecutive periods and with the same unified criteria. At the same time, this model helps financial institutions detect weak or ineffective indicators, thereby helping them focus on improving the overall rating/review and financial indicators. In the introductory theoretical part, we introduce the built models and clarify the importance of the processes to monitor and evaluate the financial security of securities companies during the financial crisis, recent global economy. In the next section, we focus on research processes, where we

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describe in detail the research methodology and main research directions. The results of the analysis are in the third section, where research results on both quantitative and qualitative characteristics have been synthesized. In the summary and statistics of the indicators, we also point out the risks that exist in general in financial institutions in general and the problems that securities businesses are facing in particular. Closing the research paper, our suggestions partly assist in overcoming financial insecurity in current securities companies in Vietnam and generate some new ideas to inspire for further studies.

## II. THEORETICAL FRAMEWORK

Currently, there are 2 sets of Laws, 10 Decrees and 20 Government circulars guiding the determination of financial safety indicators, the reporting regime on financial adequacy ratio of securities trading organizations, handling measures and responsibilities of related parties for securities trading organizations that fail to meet financial safety criteria. The Circular does not apply to the determination of tax obligations of securities trading organizations to the State budget.

Pursuant to Decision No. 617/QĐ-UBCKNN dated October 9, 2013 of the State Securities Commission, securities companies will be evaluated and classified according to the CAMEL model including the following contents. Currently, the SSC also uses the capital adequacy factor C (Capital Adequacy); Asset Quality A (Asset Quality); Quality Management M (Management); Profitability E (Earnings) and Liquidity L (Liquidity Exposure) of CAMEL system applied to Vietnamese securities companies. The CAMEL set of indicators is divided into two groups of factors: financial indicators (C, A, E, L) and governance criteria (M). Groups of financial factors can be assessed according to data from financial statements, annual reports and other financial data that have been reviewed or controlled in accordance with the law. Governance criteria is a separate factor because this factor is difficult to quantify and mainly based on qualitative criteria. The total score values of the group of financial factors and the total score of the administrative factors are assigned a weight level showing the importance of this group of factors in the overall score of the securities company. In which, the group of financial factors has the weight of 70% and the management factor of 30%. Rating score of securities companies = Total score of financial factors x 70% + Total score of management factors x 30% After analysis, securities companies are ranked from A to E:

- Rating A: From 80 points – 100 points: Securities company whose overall rating is at the initial rating threshold of A and no factor score below 65
- Rating B: From 65 points to less than 80 points: Securities company overall rating is at the initial threshold the first is B and no factor score is less than 50 points; or initially graded A but has 1 factor score below 65 points
- Rating C from 50 points – less than 65 points: Securities company within the initial rating threshold is C and no factor score is less than 35 points; or has an initial rating of B but has 1 factor below 50 points; or have an initial rating of A but have 2 or more factors with a score of less than 65.
- D rating from 35 points to less than 50 points: the securities company is in the initial rating threshold of D; or initial rating of C but with 1 factor score below 35; or initially rated as B but with 2 or more factors with scores below 50.
- Rating E from 0 to less than 35 points: Securities companies fall into one of two cases: they can be scored but not in the above cases. or unable to score due to failure to perform reporting obligations as prescribed or at the request of the SSC.

Management - Ability to manage: There are 19 criteria to evaluate Management Quality, but most of them are qualitative and require information gathering from many sources other than financial statements

including internal data sources. For example, criteria 3 and 4 require the number of years of experience in the financial/business field of the Chairman and the Director/General Director, or criterion 3 refers to the modernity of the system. information technology, etc. These criteria are difficult to quantify and require a relatively large source of internal information. Some other indicators require information of all brokers in the industry such as criterion 12: Proportion of stock trading volume made through the company (on two exchanges) / Total trading turnover of market (total transaction turnover of the two departments).

### III. RESEARCH METHOD

The objective of studying the financial safety of securities companies in Vietnam is to ensure transparency, honesty, and reliability and to protect the interests of investors. Securities companies are in need of ensuring that their business activities comply with regulations, processes, and standards on risk management and risk mitigation to minimize risk to investors. Regarding the defined goal, we have established several commonly used indicators, including the ratio of available capital, and the set of CAMELS model indicators (capital adequacy - C, asset quality - A, management - M, earning - E, liquidity - L, and sensitivity - S).

After collecting statistical data on HOSE at the end of 2021, we have classified securities companies into four groups: group 1 (Charter capital over 1500 billion dongs), group 2 (Charter capital from 1000 billion dongs to 1500 billion dongs), group 3 (charter capital from 500 billion dongs to 1000 billion dongs) and group 4 (charter capital below 500 billion dongs). Using a mixed method, we analyzed the financial statements, prospectuses, annual reports, and management reports of the companies, and then selected 12 companies with good growth rates, the highest profit after tax, and equity over 1500 billion VND to carry out the research. The group of 12 securities companies we selected for our research analysis in the model is listed in the table below:

**Table 1: List of securities companies researched**

Abbreviated name	Company name	Charter capital (VND)
ACBS	ACB Securities Co., Ltd	3.000.000.000.000
AGRISECO	Agribank Securities Corporation	2.120.000.000.000
HSC	Ho Chi Minh City Securities Corporation	4.580.523.670.000
KIS	KIS Vietnam Securities Corporation	3.761.579.550.000
MAS	Mirae Asset Securities Corporation	6.590.500.000.000
MBS	MB Securities Corporation	2.676.183.240.000
MSVN	Maybank Securities Co., Ltd	2.200.000.000.000
SSI	SSI Securities Corporation	14.911.301.370.000
TVSI	Tan Viet Securities Corporation	2.639.000.000.000
VIX	VIX Securities Corporation	5.821.391.890.000
VNDS	VNDIRECT Securities Corporation	12.178.440.090.000
FPTS	FPT Securities Corporation	1.950.599.510.000

*Source: Compiled from financial statements of securities companies in 2021*

### III. RESULTS AND DISCUSSION

#### 1. Capital adequacy

##### a. Index C1 ( Equity/Total Asset)

In general, the autonomy of securities companies has been decreasing in recent years. 2018 is the year with the highest index, proving that securities companies have high financial autonomy and are less dependent on debt. Stock market.

**Table 2: Index C1 of 12 securities companies in the period 2017-2021**

Securities Company	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021
ACBS	68%	66%	74%	50%	
AGRISECO	99%	98%	93%	92%	89%
HSC	42%	58%	57%	36%	30%
FPTS	86%	79%	83%	65%	32%
KIS	46%	74%	59%	47%	48%
MAS	84%	68%	62%	50%	41%
MBS	30%	39%	35%	29%	31%
MSVN	68%	76%	66%	61%	56%
SSI	46%	38%	35%	28%	28%
TVSI	50%	60%	60%	39%	53%
VIX	70%	72%	80%	83%	80%
VNDS	31%	28%	28%	26%	26%

*Source: Compiled from financial statements of securities companies*

The success of Vietnam's stock market in 2021 is like that despite many fluctuations due to the pandemic, the stock index still increased by 36% within a year. The business results of the large-cap stock market improved significantly, although it slowed down in the third quarter under the influence of the fourth Covid-19 pandemic, the corporate bond market continued. boom as of November, the issuance volume reached nearly 500 trillion to warn potential risks of corporate bonds to investors, the Government has issued documents to inspect and handle violations in this market; Foreign investors still had a record net selling but were absorbed by domestic investors. It seems that these securities companies have a slow growth rate of equity in the period from 2018 to 2021.

The most notable among the 12 securities companies is FPTS, the growth rate of equity and total assets in the 3 years of 2017 - 2019 increased sharply by 39%, leading to an increase in this indicator, in 2021 with total assets increasing by 2 times. but equity only increased by 7 trillion dong, making this indicator drop sharply, showing that the company is increasingly dependent on borrowed capital, thereby reducing financial autonomy. MBS, SSI, VNDS are the 3 securities companies with the lowest safety ratio in this group of securities companies below 51% in comparison with the law: Total assets increased rapidly and strongly but the equity increased slowly and accounted for ¼ in total assets which leads these companies to always remain low.

#### **b. Index C2 (equity/legal capital)**

In Vietnam, Decree 155/2020/ND-CP, based on Clause 1, Article 175, stipulates as follows “Minimum charter capital for business operations of securities companies in Vietnam is as follows:

- + Securities industry: 25 billion VND
- + Proprietary securities trading: 50 billion VND
- + Underwriting securities: 165 billion VND
- + Securities investment consulting: 10 billion VND”

In general, the equity of the companies all exceeded the regulation. regulations and this rate is high. Securities companies have always improved this index over the years. Especially in 2021, securities companies increase their equity, creating a premise for this index to grow strongly by 679% compared to 2020.

**Table 3: Index C2 of 12 securities companies in the period 2017-2021**

Securities Company	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021
ACBS	620%	608%	628%	685%	1365%
AGRISECO	588%	623%	656%	699%	817%
HSC	930%	1020%	1435%	1480%	2442%
FPTS	518%	658%	704%	734%	994%
KIS	371%	655%	698%	997%	1568%
MAS	702%	1535%	2046%	2212%	2866%
MBS	428%	487%	557%	687%	1137%
MSVN	322%	420%	443%	478%	926%
SSI	2872%	3052%	3134%	3291%	4740%
TVSI	200%	399%	444%	519%	1178%
VIX	308%	368%	474%	583%	474%
VNDS	823%	991%	1083%	1273%	3274%

*Source: Compiled from financial statements of securities companies*

The most noteworthy aspect of this indicator is that SSI has been growing for many years, indicating that the company is striving to improve its position in top stocks. HSC and MAS achieved breakthroughs in 2018 and maintained steady growth for 4 years during the research period. It is worth noting that VIX must be mentioned because the company is growing, but VIX will grow and decline slowly in 2021, which explains this. We find that VCSH and TTS are both declining, and the company's VCSH has declined by more than 300 trillion Vietnamese đồng.

### c. Ratio C3 (Liquid Capital Ratio/Total Risk Value)\*100

It was found that in the period of 2017 - 2019, the indicators increased steadily, but in the period of 2020 - 2021, they decreased gradually. In 2020, with the outbreak of the pandemic leading to fear of investors withdrawing money from the market, the market fell while securities companies lowered the total value of market risk in that year. As of December 31, 2021, we see that all securities companies that meet the criteria of liquid capital ratio according to circular 91/2020 greater than 180% are considered healthy operations.

**Table 4: Total market risk of 12 securities companies (Unit: million VND)**

Securities Company	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021
ACBS	28.725	50.459	36.215	31.691	59.777
AGRISECO	31.595	46.058	127.387	170.946	92.131
HSC	188.102	65.142	274.189	180.103	276.901
FPTS	7.940	27.731	29.874	54.899	63.181
KIS	2.080	5.344	10.555	68.311	131.822
MAS	25.813	31.238	80.686	93.315	183.563
MBS	189.905	194.422	236.916	249.049	243.038
MSVN	-	-	-	-	5
SSI	395.321	708.415	868.970	509.309	669.998
TVSI	16.946	113.010	99.745	82.934	275.477
VIX	228.038	284.635	278.059	245.047	365.531
VNDS	249.876	255.873	340.503	179.184	942.698

*Source: Report on the ratio of available capital of securities companies*



In 12 securities companies, we see that each year the companies will have different market risk value funds. It is worth mentioning that SSI has always had a high risk value over the years, showing that the company has appreciated the risks of the market, proving that if something goes wrong, the company can still meet some of the risks. with the market. VNDS Company in 2021, the company calculates a market risk value of nearly VND 950 trillion, but perhaps we can see it in the company when we appreciate the impact of the pandemic and the US-China trade war on the market. Vietnam stock market.

**Table 5: Total settlement risk value of 12 securities companies (Unit: million VND)**

Securities Company	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021
ACBS	104.580	140.134	168.816	196.266	259.615
AGRISECO	504.088	546.114	552.469	552.347	500.425
HSC	106.755	119.623	185.836	50.802	360.063
FPTS	11.083	26.850	21.810	29.724	48.478
KIS	197.817	182.887	181.090	169.035	156.734
MAS	8.395	65.872	56.768	48.315	131.242
MBS	66.319	37.906	75.781	80.283	186.329
MSVN	9.152	13.700	7.881	10.224	3.139
SSI	601.194	1.263.873	1.265.528	1.528.813	1.541.739
TVSI	4.346	26.726	10.709	11.166	8.137.955
VIX	15.564	15.465	23.155	17.606	16.503
VNDS	197.223	437.540	291.227	338.836	697.281

*Source: Report on the ratio of available capital of securities companies*

It was found that Agriseco and SSI in the research period both assessed the value of payment risk higher than other companies. HSC, KIS, MBS, and VNDS, we see that the company has an evaluation but not as high as the above two companies, with an increase in value in 2021.

**Table 6: Total value of operational risk of 12 securities companies (Unit: million VND)**

Securities Company	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021
ACBS	86.215	104.811	71.979	95.001	240.000
AGRISECO	60.000	60.000	60.000	50.000	93.629
HSC	202.940	378.148	257.578	379.561	582.254
FPTS	60.000	60.000	60.000	60.000	114.085
KIS	60.000	50.000	55.631	132.580	355.346
MAS	660.000	65.232	119.346	189.636	114.085
MBS	179.065	185.803	183.932	202.756	288.471
MSVN	60.000	60.000	50.694	60.309	160.000
SSI	317.490	438.581	462.977	615.676	536.233
TVSI	60.000	62.134	133.215	296.367	579.955
VIX	60.000	60.000	73.653	80.455	109.426
VNDS	98.312	249.403	247.802	289.296	535.281

*Source: Report on the ratio of available capital of securities companies*

In 2021, companies are all increasing the value of operational risk. We see that due to the high number of new securities accounts opening, the transaction volume will be higher, there may be technical errors, system and business process errors, human errors in the trading process, there may be a lack of money. business capital arising from expenses and losses from investment activities. We found that the following

companies with good network systems or good business management personnel all have the same operating risk value over the years such as: Agriseco, FPTS, KIS, TVSI, VIX, which we highly appreciate. these companies.

**Table 7: Available capital of 12 securities companies (Unit: million VND)**

Securities Company	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021
ACBS	1.586.514	1.588.109	1.706.049	2.023.131	3.962.269
AGRISECO	1.893.648	2.354.846	2.680.321	2.808.131	2.960.712
HSC	2.619.776	2.844.273	4.058.161	4.016.542	6.345.248
FPTS	1.356.264	2.027.393	2.194.251	2.260.358	3.286.303
KIS	1.169.615	2.031.183	1.978.225	2.694.675	4.373.071
MAS	929.528	2.586.770	4.796.998	5.538.338	7.297.763
MBS	1.409.814	1.536.871	1.646.525	1.919.570	3.166.642
MSVN	932.820	1.215.803	1.271.782	1.382.465	2.715.854
SSI	6.553.196	7.866.329	8.248.448	8.200.484	10.263.130
TVSI	574.018	1.164.371	1.269.197	1.355.033	3.246.086
VIX	919.253	1.101.682	1.239.282	1.739.019	3.742.774
VNDS	2.305.078	2.758.422	2.936.111	3.321.157	9.003.546

*Source: Report on the ratio of available capital of securities companies*

The companies all maintain good working capital, we see 12 securities companies with healthy and good operations, meeting the safety thresholds according to current regulations. Shows that, if there is an event, the company can convert this available capital into cash in 90 days to respond to that event and handle it best.

## 2. ASSET QUALITY (A)

### a. Ratio A1 (Rate of Total Assets After Risk Adjustment/Total Assets)

In securities companies, the proportion of assets of securities companies is mostly financial investments and receivables. The average A1 ratio of 12 securities companies over the years is over 80%. This ratio has changed and increased in the last two years, much higher than the prescribed level of 60% or more, proving the quality of the products. secured assets. Most of the assets of 12 securities companies are safe assets with relatively low risk.

**Table 8: The average value of the A1 ratio and Converted average score of A1 of 12 securities companies in the period 2017-2021**

Year	The average value of the A1 ratio (%)	Converted average score of A1
2017	88,84	85,83
2018	88,26	83,33
2019	88,88	84,17
2020	90,84	94,17
2021	92,50	92,50

In the period from 2017-2019, the trends of the average value of the ratio and the average of the A1 ratio point increase and decrease are the same However, the trend of the A1 ratio average value and the average score after conversion There is a difference between 2020 and 2021, while the average ratio has a slight increase of 1.31%, the average rating score of securities companies has a slight decrease of 1.67 points from 94.17 to 92. ,50 points.

**b. Ratio A2 [Provision ratio/(Short-term investments + Long-term investments + Receivables)]**

To ensure the ability to compensate for risks when they occur, securities companies must make provision for risky assets, because most of the high proportion of securities companies' total assets are investments and other assets. accounts receivable have a high level of risk. As a rule, if the A2 ratio is below 8%, the property is considered safe. From 2017-2019, the number of securities companies in the group of 12 research companies accounted for 40%-50% of the companies that did not ensure the financial safety ratio. From 2019 to 2021, there is a huge change in this index in the group of 12 companies when this number is reduced to only 1 company that does not guarantee the financial safety ratio, which is Agribank Securities Joint Stock Company. This is also a company with a very high A2 ratio from 2017-2021, all over 90%, which is due to the company's very large provisions, including provision for impairment of financial and financial assets. mortgaged property. The A2 ratio maintained over the years at less than 3% is very good as in some companies such as MAS, SSI, TVSI, VIX, it proves that companies have effective investment strategies with little provision or KPT of companies is decreasing, there are less bad debts, leading to a decrease in the provision of KPTs. Especially in 2021, HSC and MAS will have the right rate of 0%.

**Table 9: The average value of the A2 ratio and Converted average score of A1 of 12 securities companies in the period 2017-2021**

Year	The average value of the A2 ratio (%)	Converted average score of A2
2017	29,04	40
2018	22,73	46,67
2019	16,83	46,67
2020	10,39	60,83
2021	11,93	76,67

The average A2 value of securities companies tends to increase over the years and there is a big fluctuation after year 5, increasing by 36.67 points. This reflects the larger A2 ratio, which reflects the larger value of provisions that the securities company has to make, showing that the company's management ability is not effective, leading to the evaluation score, so it will be gradually converted to a standard scale. short. But in the two years 2020-2021, the score increased significantly because most of the securities companies have had changes in management of provisions gradually decreasing. However, the score is still not high, the average value of the A2 ratio still does not ensure the financial safety threshold as prescribed.

**c. Ratio A3 (Receivables/Total Assets Ratio)**

To ensure financial safety, the ratio of Receivables/Total Assets currently applied to Vietnamese securities companies is 50%, the quality of assets of securities companies will be ensured, less dependent on accounts. Receivables. Because the higher the ratio of accounts receivable / total assets (A3), the higher the level of financial safety of the securities company will be dependent on the receivables. The average value of the ratio of Receivables/Total Assets of 12 securities companies is small, all reaching the allowable safety level of less than 50%. In most securities companies, receivables account for a relatively small proportion of total assets. This proves that the possibility of capital misappropriation of 12 securities companies is very low and should be promoted in the future.

**Table 10: The average value of the A3 ratio and Converted average score of A3 of 12 securities companies in the period 2017-2021**

Year	The average value of the A3 ratio (%)	Converted average score of A3
2017	3,57	100
2018	2,06	100
2019	2,28	100
2020	1,79	100
2021	2	100

Realizing that, mainly accounting for a large proportion of the receivables of securities companies is from margin lending transactions. In the case when the stock market is in trouble, investors with a high margin rate will have to bear many great risks and this greatly affects the business results of securities companies. Asset quality of securities companies depends greatly on the quality of receivables. In the period of 2017-2021, the average value of the A3 ratio fluctuates slightly over the years. This trend is consistent with the relationship between the ratio value A3 and the conversion target score A3 because the smaller the A3 value, the smaller the ratio of receivables to total assets. Thus, with the group of asset quality indicators in general, 12 securities companies only achieved an average level, not yet ensuring a solid level of safety.

### 3. MANAGEMENT CAPABILITIES (M)

When it comes to the management factors of financial institutions, our team’s goal is to investigate some subjective indicators in financial and other reports (such as prospectuses, governance reports, and annual reports) and draw objective conclusions. Through securities firms, we have established different components to most clearly evaluate the management, management, and control capabilities of operating institutions in identifying, measuring, monitoring, and controlling risks in credit cooperative activities, ensuring safe and healthy operations, and ensuring compliance with applicable laws and regulations. Regarding business strategy and financial efficiency, especially for countries like Vietnam, which are in the development stage and always have policies that contradict world trends, According to information provided by the government, securities companies are more cautious in regulating their business development.

In the three years since Covid outbreak, securities companies have achieved breakthrough growth in personnel scale, number of accounts opened and growth. The company maintains, develops and expands the online trading portal. The new functions enable customers to place orders, manage their accounts and other trading support functions. The human resource management of the company is relatively good, focusing on the team of brokers to meet the needs of the stock market. In addition, risk handling activities have been constructed and implemented by securities companies in five steps: identifying risks, measuring and evaluating risks, determining risk limits, monitoring risks and handling risks.

At present, all the companies listed in our research have guaranteed a common form of risk management. However, some companies still face many risks, such as: ACBS is a family limited liability company, and most of the power is in the hands of one leader, which may lead to human resource management risks. At the same time, the risks that may lead to property rights disputes conflict, and the company’s poor management makes it impossible to expand its business model. Some enterprises in the development stage have not fully established the risk management system, and the shortage of risk management and IT talents can easily make enterprises fall into the risk of cyberspace attacks and internal network security threats.

#### 4. PROFITABILITY (E)

The goal throughout the operation of securities companies is high and stable profitability. In particular, the rate of return on sales (ROS) plays a very important role in evaluating the business performance of companies. best. The ratio of profit to revenue of 12 securities companies in the period of 2017-2021 is shown in the following chart:

**Table 11: Average ROS of 12 securities companies in the period 2017-2021**

Year	ROS (%)
2017	28,4
2018	28,42
2019	27,83
2020	29,91
2021	32,81

Source: Compiled from financial statements of securities companies

In the whole industry, the securities Corporate group with a licensed capital of more than 150 billion Vietnamese đồng has been at a high level and remained stable for some time. In the case of ROS security level > 0%, the stock group has reached and exceeded this level. In 2017, only two companies had ROS below 5%, namely KIS and MBS. This is because these two companies have implemented less effective cost management policies in the past year, coupled with the additional appropriations and significant discounts that must be charged. However, after two years of development, the company's donations have significantly improved, increasing by 15-20 times compared to 2017. Overall, in terms of ROA and ROE, the business activities of the 12 companies are profitable (after tax profit > 0), However, in terms of the profitability of the enterprise (the comprehensive results of organizational ability, management level, execution results, and final business performance for each period), the overall level is not high.

**Table 12: Average ROA and ROE of 12 securities companies in the period 2017-2021**

Year	ROA (%)	ROE (%)
2017	4,98	9,04
2018	6,62	10,97
2019	4,48	8,52
2020	5,18	10,95
2021	7,46	16,45

Source: Compiled from financial statements of securities companies

In Vietnam market conditions, ROE reaches 0% or more, but for international practice of over 15%, the securities company's finances are considered safe. This is an indicator of interest to owners and investors, who expect to invest capital in businesses. ROE of companies is still quite low, although this is a group of large companies in the market, being assessed as having good risk management ability, it is expected that the profitability will always reach a high rate. Besides, the net profitability of the asset depends on the asset's turnover and the operating profit ratio, and these two factors exist as opposites, so it can be confirmed that the low ROA is low. Fast asset turnover. The reason is that some securities companies do not invest in assets. However, the capital of a securities business organization more or less depends on the type of assets to be financed. The company wants to do a securities underwriting business that requires a large amount of capital. Self-trading activities also maintain a large amount of capital to carry out buying and selling, other activities do not require much capital. In summary, the profitability of 12 securities companies is relatively low, there are still some companies that have not yet ensured the financial safety threshold according to the profitability criteria.

**5. LIQUIDITY (L)**

Analysis of this indicator aims to assess the solvency of the enterprise to help identify the financial risks that the business has to face. For the current ratio L1. Through studying most of the group of 12 securities companies according to international practices, the L1 coefficient must reach 200% or more to be considered safe. On average, this coefficient of a group of 12 securities companies has achieved the safety level according to international practices but still ensures safety according to Vietnam’s regulations. However, some companies have a relatively low ratio and some years are even lower than the safe threshold such as: VNDS and SSI. The reason explained by SSI is that they have not yet ensured the autonomy to pay short-term debts when they are due. Most of the company’s current assets are in the form of short-term investments, while the financial assets are available for sale. This, in turn, can lead to the company’s disadvantage when it comes to debt repayments when there is not enough cash to pay, forcing a decision to sell short-term financial investments or financial assets. willing to sell at a lower price than expected. The instant ratio L2 reflects the company’s ability to meet short-term liabilities in cash and cash equivalents. That is, with the amount of cash and cash equivalents available, the enterprise can ensure the ability to pay short-term debts immediately. On average, the instant ratio of the group of 12 securities companies over the years is higher than 15%, in 2017 - 2019 achieved the highest level of financial safety. However, during the period from 2017 to 2022, this rate decreased quite a lot.

**Table 13: Securities companies with an instant ratio of less than 15% in the period 2017-2021**

STT	Year 2017		Year 2018		Year 2020		Year 2021	
	Company	L2	Company	L2	Company	L2	Company	L2
1	HSC	5,06%	HSC	5,34%	ACBS	10,97%	ACBS	10,82%
2	KIS	6,83%	MAS	3,87%	HSC	2,57%	AGRISECO	9,77%
3	MAS	10,03%	SSI	4,55%	KIS	0,96%	KIS	5,92%
4	MBS	11,60%	VIX	1,28%	MAS	9,61%	MAS	11,71%
5	MSVN	11,70%	VNDS	12,98%	MBS	2,03%	MBS	1,74%
6	SSI	0,37%			SSI	1,41%	SSI	3,05%
7	VNDS	6,56%			VNDS	8,82%	VNDS	10,25%

The reason is that the amount of cash as well as cash equivalents in some highly liquid companies account for a very low proportion of current assets. This can lead to risks in payment activities of companies. Therefore, companies need to maintain this ratio at an appropriate level to both ensure liquidity and improve capital efficiency.

**Discussion**

These analyses show that CAMELS model is effective in comprehensively evaluating securities companies or financial institutions. However, the data of these 12 securities companies can’t fully represent 73 securities companies (according to statistics, by the end of 2022), because the companies facing financial security problems in Vietnam are all securities companies with a market value of less than 150 billion VND, such as Vietnam Securities United Securities Company (TVB) and Asia Pacific Securities United Securities Company (APS),...which limits the inclusiveness of our research. These companies are mainly caught in legal problems, and their organizational and management capabilities are weak, resulting in the loss of trillions of Vietnamese dong for the economy and investors. Basic companies have strong financial potential and relatively sustainable development, but there are still many shortcomings and limitations in enterprise risk management. Practice shows that the biggest risk of securities companies in the past and in the future is a terrible risk, that is, the risk of margin trading business. The financial safety supervision

index system has not covered all kinds of risks, and the supervision information system is not perfect and has not been updated regularly. Financial companies have not yet created risk management information for all employees, so that employees can consciously control their own activity risks. As a result, business risk management ability and market risk are limited.

## **6. CONCLUSION AND RECOMMENDATION**

### **6.1. Conclusion**

In general, Financial Safety plays an extremely important role for securities companies in the process of existence and development of companies. Through the process of studying the financial safety of 12 securities companies, we see their strengths and weaknesses. The indicators over the years have been improved and adapted to the market situation, we highly appreciate this issue in companies. However, there are still some limitations. In order to operate more sustainably and develop more in the coming time, we propose practical and comprehensive solutions to gradually improve Vietnam's stock market. general and securities companies in particular. The more a securities company ensures a high level of financial safety, the lower the level of risk in its operations. effective operation and competitiveness of securities companies in the market are increasingly improved. Therefore, it is extremely important to ensure financial safety at securities companies, especially in the group of large companies that have a certain position in the market and investors' confidence. and urgent.

### **6.1. Recommendation**

Securities companies are an important area of activity in a country's financial system. Therefore, to ensure financial safety for securities companies in Vietnam, it is necessary to implement a number of important solutions as follows:

In order to increase the profitability of assets of securities companies, it is necessary to use measures affecting 3 strategies (capital investment, capital management, operation management) to properly allocate capital and speed up rotation. moving capital, increasing profitability by reducing the cost-to-income ratio of each type of activity. In addition, to increase the profitability of equity, securities companies need to use major measures such as: Determining a policy to raise capital for reasonable financing; Determine a reasonable investment policy; To speed up the turnover of working capital on the basis of allocating and managing each type of capital, especially capital in cash and receivables and promoting business and services; Increase the ratio of net operating profit by monitoring the ratio of operating expenses to total net turnover, ensuring the business has managed each type of operating expenses in the best way.

Improving governance and supervision capacity of securities companies: Strengthening training and fostering management and supervision skills for officers and employees of securities companies. Ensure transparency and honesty in company operations: Securities companies should ensure transparency and honesty in their operations. This helps create trust for customers and investors, and makes it easier to monitor and administer the company's operations.

Strengthen information and technology security systems. The company needs to develop detailed and up-to-date privacy policies to ensure the information security of its systems. Use of security software: securities companies need to use security software to protect their systems from external network attacks.

Reduce risks from employees: Securities companies need to train employees so that they have a sense of information security and implement information security measures in their daily work. Upgrading the server system, strengthening the protection of customer data by using information encryption technologies, limiting access to customer data.

**APPENDIX**

**No. 1: Classification of securities companies by charter capital (2021)**

Authorized capital >= 1500	1500 > Authorized capital >= 1000	1000 > Authorized capital >= 500	Authorized capital < 500
ACBS	ABS	APEC	APSC
AIS	APG	BMSC	ASAM
AGRISECO	ASEAN SECURITIES	BVSC	BSI
FPTS	BOS	DAS	CSI
BSC	HDS	DNSE	DVSC
HSC	KSS	DSC	ECC
KBSV	NHSV	EVS	FNS
KIS	NSI	GTJA(VIETNAM)	GMC
MAS	PHS	JBSV	IRS
MBS	SBS	VFS	HASECO
MSVN	SMARTSC	WSS	HBS
SHS	TCBS		JSI
SSI	TCSC		NVS
SSV	TVB		VTSS
TPS	TVSC		RHB SECURITIES VIETNAM CO., LTD
TVSI	VCBS		VTS
VCSC	VDSC		SBBS
VIX	VietinBank Securities		SBSI
VNDS			VICS
VPS			VI Securities
YSVN			VSC

**No. 2 Capital adequacy indicators of 12 securities companies in the period 2017-2021**

Securities company name	C1= Equity/total assets					C2= Equity/legal capital					C3= working capital ratio				
	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021
ACBS	68%	66%	74%	50%	54%	620%	608%	628%	685%	1365%	723%	538%	616%	626%	708%
AGRISECO	99%	98%	93%	92%	89%	588%	623%	656%	699%	817%	318%	361%	362%	363%	431%
HSC	42%	58%	57%	36%	30%	930%	1020%	1435%	1480%	2442%	526%	505%	566%	658%	520%
FPTS	86%	79%	83%	65%	32%	518%	658%	704%	734%	994%	1716%	1769%	1965%	1563%	1456%
KIS	46%	74%	59%	47%	48%	371%	655%	698%	997%	1568%	450%	853%	800%	728%	679%
MAS	84%	68%	62%	50%	41%	702%	1535%	2046%	2212%	2866%	134%	1593%	1868%	1672%	1184%
MBS	30%	39%	35%	29%	31%	428%	487%	557%	687%	1137%	324%	368%	332%	361%	441%
MSVN	68%	76%	66%	61%	56%	322%	420%	443%	478%	926%	1349%	1650%	2171%	1960%	1665%
SSI	46%	38%	35%	28%	28%	2872%	3052%	3134%	3291%	4740%	499%	326%	318%	309%	373%
TVSI	50%	60%	60%	39%	53%	200%	399%	444%	519%	1178%	706%	577%	521%	347%	376%
VIX	70%	72%	80%	83%	80%	308%	368%	474%	583%	474%	303%	306%	331%	507%	762%
VNDS	31%	28%	28%	26%	26%	823%	991%	1083%	1273%	3274%	423%	293%	334%	411%	414%

**No. 3 Asset quality indicators of 12 securities companies in the period 2017-2021**



Securities company name	A1= Ratio of assets after risk adjustment/ total assets (excluding fixed assets)					A2=Provision ratio/(short-term investments + long-term investments + receivables)					A3=Receivables/Total Assets ratio				
	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021
ACBS	91,73%	88,98%	88,88%	92,11%	92,60%	35,14%	36,07%	16,51%	9,17%	4,72%	18,53%	0,20%	0,53%	1,20%	1,28%
AGRISECO	60,10%	65,83%	64,81%	65,42%	74,54%	166%	131%	109%	90%	119%	2,63%	2,31%	2,19%	2,31%	1,24%
HSC	92,51%	89,19%	90,36%	95,09%	94,99%	4,21%	3,96%	2,34%	1,19%	0,00%	7,16%	14,12%	5,15%	2,12%	3,45%
FPTS	95,17%	95,08%	95,26%	95,53%	97,57%	36,81%	3,92%	2,28%	2,09%	0,97%	0,74%	0,56%	0,37%	0,47%	0,34%
KIS	89,14%	90,95%	92,99%	94,13%	93,48%	12,19%	23,34%	24,62%	8,02%	6,89%	1,12%	0,91%	0,88%	1,45%	1,18%
MAS	96,25%	97,59%	97,39%	97,50%	97,09%	0,42%	0,19%	0,38%	0,40%	0,00%	1,64%	1,19%	0,71%	0,34%	0,29%
MBS	89,77%	88,84%	89,43%	92,36%	93,43%	35,56%	38,04%	19,98%	2,34%	2,43%	3,64%	1,05%	1,06%	2,84%	1,25%
MSVN	95,13%	95,53%	97,05%	96,97%	96,70%	51,91%	28,69%	19,74%	7,87%	5,82%	0,88%	0,89%	0,91%	1,87%	0,70%
SSI	92,94%	89,83%	90,34%	92,55%	94,57%	0,32%	2,04%	1,74%	1,37%	1,20%	0,84%	0,24%	0,37%	0,89%	3,12%
TVSI	93,21%	89,87%	88,98%	90,11%	87,06%	0,06%	0,25%	0,03%	0,02%	0,06%	0,66%	0,31%	1,09%	4,32%	8,74%
VIX	76,90%	76,40%	78,75%	83,76%	89,60%	1,54%	1,13%	1,23%	1,37%	0,97%	3,27%	1,49%	12,23%	1,51%	0,91%
VNDS	93,18%	90,99%	92,37%	94,59%	94,13%	4,34%	4,13%	4,15%	0,84%	1,07%	1,78%	1,50%	1,89%	2,10%	1,53%

Appendix No. 4: Profitability indicators of 12 securities companies in the period 2017-2021

Securities company name	E1 = Profit after tax/Total sales					E2 = Profit after tax/Average equity				
	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021
ACBS	27,896%	14,812%	26,594%	28,473%	31,457%	7,22%	4,51%	6,85%	8,28%	13,22%
AGRISECO	35,046%	12,200%	14,076%	16,211%	22,673%	3,70%	3,63%	3,47%	4,62%	15,92%
HSC	35,970%	36,169%	30,875%	32,471%	23,441%	19,85%	22,07%	10,05%	11,95%	15,66%
FPTS	50,18%	64,82%	49,70%	38,81%	58,26%	11,54%	24,81%	10,15%	7,74%	28,36%
KIS	1,15%	22,85%	30,40%	22,00%	17,92%	0,22%	3,52%	6,06%	6,62%	11,64%
MAS	50,94%	35,51%	39,59%	34,65%	30,33%	5,69%	4,33%	6,16%	7,11%	8,68%
MBS	2,83%	16,83%	24,01%	23,96%	26,11%	1,87%	12,14%	13,76%	13,04%	17,20%
MSVN	18,30%	21,53%	23,28%	27,69%	31,78%	4,14%	5,20%	5,18%	7,32%	7,26%
SSI	33,79%	28,69%	23,74%	41,71%	48,15%	13,48%	14,23%	9,65%	12,72%	18,95%
TVSI	27,66%	18,43%	20,32%	15,80%	17,49%	13,55%	5,05%	10,98%	15,04%	16,63%
VIX	19,56%	46,38%	26,36%	44,73%	46,74%	8,47%	19,61%	8,19%	18,78%	19,56%
VNDS	37,50%	22,83%	24,95%	32,42%	39,38%	18,77%	12,51%	11,78%	18,14%	24,26%

Appendix No. 5 Solvency indicators of 12 securities companies in the period 2017-2021

Securities companies	L1 = Short-term assets/short-term liabilities					L2= Ratio of cash and cash equivalents/current liabilities				
	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021	Year 2017	Year 2018	Year 2019	Year 2020	Year 2021
ACBS	302%	283%	370%	185%	214%	32,73%	50,93%	16,83%	10,97%	10,82%
AGRISECO	10191%	4462%	1354%	1013%	958%	1594,12%	61,86%	86,94%	71,42%	9,77%
HSC	168%	231%	229%	153%	142%	5,06%	5,34%	28,47%	2,57%	42,24%
FPTS	655%	436%	563%	268%	143%	69,98%	86,99%	12,19%	17,29%	28,87%
KIS	182%	374%	238%	185%	197%	6,83%	27,88%	13,78%	0,96%	5,92%

MAS	598%	294%	253%	210%	166%	10,03%	3,87%	23,41%	9,61%	11,71%
MBS	179%	247%	183%	140%	158%	11,60%	31,26%	16,91%	2,03%	1,74%
MSVN	300%	399%	288%	251%	225%	11,70%	70,04%	19,87%	16,24%	36,62%
SSI	184%	165%	136%	112%	128%	0,37%	4,55%	6,34%	1,41%	3,05%
TVSI	116%	438%	545%	913%	799%	37,12%	183,43%	71,47%	43,75%	15,13%
VIX	1916%	484%	812%	1654%	1049%	20,80%	1,28%	71,43%	43,77%	17,90%
VNDS	138%	145%	142%	120%	139%	6,56%	12,98%	7,74%	8,82%	10,25%

**Appendix No. 6: Table of total scores and ratings of 12 securities companies according to the CAMEL model**

Securities company name	Year 2017		Year 2018		Year 2019		Year 2020		Year 2021	
	Scores	Classification	Scores	Classification	Scores	Classification	Scores	Classification	Scores	Classification
ACBS	85	A	79	B	80	A	73	B	85	A
AGRISECO	81	A	80	A	78	B	80	A	75	B
HSC	77	B	82	A	91	A	77	B	86	A
FPTS	87	A	95	A	87	A	89	A	85	A
KIS	61	C	81	A	77	B	71	B	71	B
MAS	79	B	81	A	91	A	77	B	81	A
MBS	63	C	75	B	74	B	74	B	77	B
MSVN	72	B	87	A	81	A	86	A	90	A
SSI	77	B	76	B	74	B	68	B	74	B
TVSI	76	B	89	A	92	A	84	A	85	A
VIX	86	A	81	A	93	A	94	A	90	A
VNDS	74	B	74	B	74	B	68	B	76	B

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**Part 2**  
**Business Administration**

## DIGITAL TRANSFORMATION AND BUSINESS MODEL INNOVATION IN INTERNATIONAL BUSINESS ENTERPRISES IN VIETNAM: A RESOURCE-BASED APPROACH

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*ABSTRACT : The overall objective of this study is to examine the correlation between digital transformation and business model innovation through enterprises' resources, including social networks, human capital, and dynamic capabilities. Our research results show the link between digital transformation and business model innovation, clarifying the role of human capital and social networks in helping businesses access and utilize specific resources for development, as well as the impact of dynamic capabilities on helping businesses maintain and develop sustainably in the current volatile economic situation. Some recommendations and suggestions have been made to help international business enterprises in Vietnam seize the opportunity to digitally transform, followed by innovating their business activities. The study also points out some remaining limitations and suggests directions for further research to improve.*

*Keywords: social networks, human capital, dynamic capabilities, business model innovation, digital transformation.*

### 1. INTRODUCTION

In recent years, the import and export activities of international business enterprises in Vietnam have made certain progress but still face many difficulties and challenges. The level of competition in production and services is not high because the level of technology is still low; most of the enterprises are still small and do not have much experience in management; resources are limited; and there is no specific direction in the process of participating in the global supply chain. Additionally, in the face of unexpected world fluctuations such as the economic downturn and cost-of-living crisis in China and the conflict between Russia and Ukraine, Pierre, O.G. - The Chief Economist of the International Monetary Fund (IMF) has forecast that the global economic situation in 2023 will be very difficult. Most of the major global economies will experience negative growth for two consecutive quarters, three of which include the US, the European Union, and China.

As Vietnamese international business enterprises largely participate in the global supply chain through exporting products and services, an important trend for businesses is the need to transform digitally to be able to participate more deeply in the global supply chain and adapt to changes in the world situation. However, their conversion speed is still slow, and not all businesses can successfully implement digital transformation. Under the negative impact of the economy and the challenges that Vietnamese businesses are facing, identifying the supporting factors for the success of digital transformation, which contributes to promoting business model innovation, is necessary and important.

It is obvious that many useful discoveries have given a better knowledge of digital transformation in recent years. However, in terms of resource application, there is almost no research paper assessing

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the impact of enterprises' social networks on digital transformation implementation. Moreover, although there has been some micro-foundation on building dynamic capabilities for strategic changes, studying and examining how organizations build dynamic capabilities for digital transformation is still meager. In addition, some theories, such as human resource theory (Nwankpa et al., 2016), dynamic capabilities theory, and organizational capability theory (Li et al., 2018) have been applied to previous research to explain the internal forces of enterprises to support the digital transformation process. However, the theories of social networks, human capital, and dynamic capabilities have not been mentioned to explain the formation of external resources to promote digital transformation for international business enterprises, especially in a transition economy like Vietnam. Therefore, to learn more about the above factors, this research studies the role of digital transformation and business model innovation through considering the impacts based on resources: social networks, human capital, and dynamic capabilities, to help international businesses in Vietnam develop sustainably in the fluctuations of the economy.

Consequently, the current paper seeks to make the following contributions to the existing literature.

*First*, the research builds models to assess the relationship among digital transformation, business model innovation and the three factors consisting of social networks, human capital, and dynamic capabilities of international business enterprises in Vietnam.

*Second*, the research proves that social networks can help businesses access the resources needed for digitalization, while human capital and dynamic capabilities can actively support the implementation of digital transformation.

*Third*, the research proves that digital transformation will contribute to the creation of business model innovation.

*Fourth*, the research presents some management implications to help international business enterprises in Vietnam seize opportunities to digitally transform and innovate their business models through the mentioned resources.

## **2. THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT**

### **2.1. Theoretical framework**

#### **2.1.1. Business model innovation**

##### *a) Business model*

The advent of the Internet has dramatically increased research on business models, especially in the past decade (Zott et al., 2011). The business model is integrated with specific business aspects (Winter and Szulanski, 2001; Baden-Fuller and Haefliger, 2013; Baden-Fuller and Mangematin, 2013). There are three main aspects that explain a company's business model: value creation, value proposition, and value capture (Morris et al., 2005; Johnson et al., 2008; Baden-Fuller and Haefliger, 2013; Zott and Amit, 2013; Massa and Tucci, 2014; Spieth et al., 2014).

##### *b) Business model innovation*

Business model innovation is the enhancement of a business model from very basic and low-value models to more advanced and valuable models. While some researchers argue that business model innovation can occur even when only one of the elements or components of the business model is changed (Lindgardt et al., 2009; Demil and Lecocq, 2010; and Abdelkafi et al., 2013), some other researchers define business model innovation as an entirely different form of innovation than product or process innovation (Baden-Fuller and Mangematin, 2013; Björkdahl and Holmén, 2013; Massa and Tucci, 2014). In fact, business

model innovation often occurs as a result of external factors, such as globalization (Lee et al., 2012), changes in the competitive environment (De Reuver et al., 2013), opportunities from new technologies, or opportunities related to behavior (Wirtz et al., 2010). In such environments, previously successful and well-established business models may no longer be profitable (Chesbrough, 2007, 2010). Thus, the ability to innovate business models regularly and successfully can increase an organization's resilience to changes in the environment and form a sustainable competitive advantage (Mitchell and Coles, 2003).

### **2.2.2. Digital transformation**

Digital transformation is the use of new digital technologies to improve business such as by enhancing the customer experience, streamlining operations, or creating new business models (Fitzgerald et al., 2013). As such, digital transformation is not merely the digitization of resources but also the value and revenue generated from digital assets (McDonald and Rowsell-Jones, 2012). Digital technologies not only impact product transformation, business processes, or sales but also entire business models (Hess et al., 2016). Through digital transformation, organizations can integrate digital technology into many aspects of their operations to attract customers (Weill & Aral, 2007), increase market share, and reduce operating costs (Weill & Aral, 2007; Căpușeanu et al., 2021). A study by the Massachusetts Institute of Technology also found that digitally transformed businesses are 26% more profitable than conventional businesses (Schwertner, 2017).

### **2.2.3. Resource-based View**

The Resource-based View (RBV) is one of the most influential theories for explaining a firm's sustainable competitive advantage. The basic idea of this view is that firms can achieve a sustainable competitive advantage when they possess and control valuable and scarce resources that are not easily imitated or substituted (Barney, 1991, 1994, 2002). In RBV, resources are broadly defined as anything that can be considered the strength or weakness of a given enterprise (Wernerfelt, 1984), and all assets, capabilities, processes, attributes, information, knowledge, etc. controlled by the business allow the business to formulate and implement strategies, which improve performance and efficiency (Barney, 1991, 2002). As these definitions indicate, RBV recognizes different types of resources that are important to a business. In the research papers, both Barney (1991) and Grant (1991) argue that human capital and relationships with stakeholders, or in other words, social networks, are the intangible resources of enterprises. Due to their unique and difficult-to-imitate nature, it is suggested that intangible resources are the most important asset for a company (Drucker, 1992; Quinn, 1992). Therefore, the social network and human capital of enterprises can create sustainable competitive advantages if enterprises can control and effectively use these two resources in their business operations.

### **2.2.4. Theory of social networks**

A social network can be considered a relational model that links a defined group of people or social subjects (Seibert, Kraimer, & Liden, 2001) to achieve the goals of individuals and organizations (Granovetter, 1985; Powell et al., 2005), which enables collaboration and facilitates the sharing of ideas, information and knowledge and the mobilization of other resources (Fliaster & Spiess, 2008; Gulati, Nohria, & Zaheer, 2000; Hoang & Antoncic, 2003). Important structural features of social networks include the size and strength of relationships (Anderson, 2008; Cross & Cummings, 2004; Gabbay & Leenders, 2001). Thus, the larger the social network, the more effective the access to new information and knowledge will be (Burt, 1992). Managers with social networks outside the business often have a more comprehensive understanding of the fit between different strategic options in the business environment and tend to have a greater degree of

strategic flexibility in their organization. (Fernández-Pérez, Verdú-Jóver, & Benitez-Amado, 2013). When in a network, they not only receive benefits in the linking process, such as timely receiving information, successfully mobilizing resources, and accessing available resources, but also achieve benefits from the advantage of scale through collective business activities like building trust with partners and customers, promoting cooperation, and integrating into the overall value chain (Khayesi & George, 2011; Tokarczyk et al., 2007, Jasmine Tata & Sameer Prasad, 2015).

### **2.2.5. Theory of human capital**

According to McGregor et al. (2004), the definition of human capital covers a broader spectrum of the human resources of the workforce and requires more specific competencies in the form of knowledge, skills, and attributes of managers and the people they manage. In another aspect, Choudhury and Mishra (2010) defined human capital as knowledge, skills, expertise and the ability of employees to help the company operate and succeed. Along with that, Lien and her colleagues (2022) affirmed that human capital is an important factor contributing to the development of society and the growth of the economy quickly and sustainably. Human capital is also a contributing factor to the success of businesses, playing an important role in helping international businesses create competitive value. Mahlow and Hediger (2019) also stated that the concept of “education” must be developed appropriately to be able to face the digital transformation process. Therefore, enterprises can invest in human capital through education and training to improve the quality of their human resources.

### **2.2.6. Theory of dynamic capabilities**

According to Barreto (2010), dynamic capabilities are the potential of enterprises to solve problems systematically, formed by the tendency to identify opportunities and risks, make timely decisions according to market orientation and change their resource base. With this definition, dynamic capabilities is a multidimensional definition based on environmental analysis, making the right choice at the right time and fundamentally changing the resources of the enterprise. Capturing dynamic capabilities allows businesses to continuously integrate, restructure, renew, regenerate resources and, most importantly, upgrade and reinvent core competencies to respond to changing business environments and maintain competitive advantages. In this study, dynamic capabilities are analyzed in three dimensions from a process perspective, namely: strategic cognitive competencies (Neill, McKee, & Rose, 2007; Pandza & Thorpe, 2009; Weick, Sutcliffe & Obstfeld, 2005); timely decision-making competencies (Benjaafar, Morin, & Talavage, 1995; Shafman & Dean, 1997) and change-implementing competencies (Harrelld, O’Reilly, & Tushman, 2007; Noble, 1999).

## **2.3. Hypothesis development**

### **2.3.1. Effects of digital transformation on business model innovation**

In recent years, new digital technologies such as big data, artificial intelligence, and machine 4.0 have revolutionized the way companies do business (Rothberg & Erickson, 2017). The exploitation and integration of digital technology often affects the majority of companies beyond their limits by impacting products, business processes, sales channels, and supply chains. This influence can lead to many potential benefits, such as increased revenue or productivity, innovation in value creation and new forms of customer interaction. From there, the entire business model can be reshaped or replaced (Downes & Nunes, 2013). Similar to the above opinion, Schwertner (2017) also believes that new technologies can accelerate business model innovation and extend standard value chains in the provision of new products and services for consumers.

Today, it is no surprise to see more and more companies undertaking digital transformation to revolutionize their business models so that they can take advantage of the benefits of digitalization and new



forms of collaboration that it brings to companies, such as customers, employees, and suppliers (Kiel et al., 2017; Bresciani et al., 2018; Grandinetti et al., 2020 ). More specifically, according to Nowicka (2019), applying digital transformation helps to increase the level of process automation, thereby eliminating unnecessary operations. Besides, digital innovation will help reduce risks, redesign processes, reduce errors, increase sales (Menon & Kohli, 2013), as well as improve customer experience and market share.

**H1: Digital transformation has a positive impact on business model innovation.**

### ***2.3.2. Effects of social networks on digital transformation***

Based on the research of Chaolin Lyu (2022), companies in most industries that are developing digital technology or trying to digitally transform have to face many pressures including limited resources, difficult communication and a lack of innovation. Digital transformation requires a long cycle time, high risk and large investments, which increase the pressure on their resources. Under a lot of pressure, internal resources can no longer meet the innovation needs of enterprises. Therefore, making good use of the enterprise's social networks will be an advantage when accessing external resources. The relationship network can be seen as a foundation to help managers access resources from subjects in the horizontal network such as customers, suppliers, competitors... and subjects in the vertical network such as government levels, companies in the same group... (Landry et al., 2000; Jansen et al., 2011), including capital, information, advice, emotional support and endorsements (Coleman, 1988). These resources will create a strong driving force, promoting the digital transformation process for businesses.

**H2: Social networks have a positive impact on digital transformation.**

### ***2.3.3. Effects of human capital on digital transformation***

Research by Bontis, Dragonetti, Jacobsen & Roos (1999) has defined human capital to represent the human factor in the organization, which is a combination of intelligence, skills and experience. In the process of digital transformation, technology is supposed to be a means of support and people are the decisive factor. Because it is necessary that employees have enough knowledge, ability and qualifications to apply new technology in the business activities of enterprises. In order for people to meet the requirements of the digital transformation process, it is necessary to have skills in technology management (Kaivo-Oja, J., Roth, S., & Westerlund, L., 2017), leadership skills (Henderikx, M., & Stoffers, J., 2022), communication skills (Andriole, SJ, 2018) ... and new trends in skill development (Sousa, MJ, & Rocha, A., 2019). Human capital is also considered a treasure trove of skills that workers possess (Goldin, 2016).

**H3: Human capital has a positive impact on digital transformation.**

### ***2.3.4. Effects of dynamic capabilities on digital transformation***

In an ever-evolving technology age, when digital disruptions make current skills and resources held in a company obsolete, they need to focus on improving their technology skills to adapt to this change. Among them, dynamic capabilities can be an important factor during a company's digital transformation. Teece, Pisano, and Shuen (1997) have identified a dynamic capability that helps a company respond to rapidly changing circumstances in a timely manner. Therefore, using the usefulness of dynamic capabilities is necessary to maintain them in dynamic and constantly changing environments, such as those impacted by digital technology.

Conventional competencies allow a company to perform operational tasks such as accounting, human resource management, logistics and marketing, but they can be easily replicated in a digital environment and no longer support sustainable competitive advantage. In contrast, dynamic capabilities manage changes in a company's normal capabilities (Teece, 2007), are harder to replicate to help the company maintain a

competitive advantage (Teece, 2014) and support the development of the company towards stepping out of the “comfort zone”, (Helfat & Winter, 2011).

In literary strategic management, adaptation to changes in technology is often studied through Eisenhardt and Martin, 2000; Teece, 2007; Warner and Wager, 2019, dynamic capabilities provide a consistent approach to studying digital transformation and examining the powerful impact of digital technology on business (Warner and Wager, 2019). Therefore, to successfully participate in digital transformation, companies need a set of capabilities that facilitate changing their business models and organizations (Teece, 2007).

**H4: Dynamic capabilities have a positive impact on digital transformation.**



Source: Synthesized and proposed by the research team

**Figure 1. Proposed research model**

**3. RESEARCH METHOD**

**3.1. Sample and data collection**

We use qualitative and quantitative methods to conduct the research by sending online forms through Google Forms by email and social media to employees of Vietnamese international business enterprises. After collecting a sufficient number of samples, the research team began to conduct preliminary analytical research to produce the final research results. With 193 sample sizes collected from September 2022 to April 2023 and no rejected votes, 100% of the survey questionnaires will be used in data analysis. Characteristics of the research sample include gender, age, business sector, and type of activity.

**Table 1. Sample demographic information**

Category		Frequence	Ratio (%)
<b>Gender</b>	Male	88	45.6%
	Female	105	54.4%
<b>Age</b>	20 – 30	117	60.6%
	31 – 40	63	32.6%
	41 and over	13	6.8%
<b>Business Sector</b>	Production	64	33.2%
	Commercial	89	46.1%
	Service	40	20.7%
<b>Business Type</b>	Private	65	33.7%
	Limited Liability	44	22.8%
	Shareholding	64	33.2%
	Others	20	10.3%

Source: Survey data analysis results until April 2023

### 3.2. Measurement scale

The questionnaire uses a 5-point Likert scale to measure variables. On this scale, 1 symbolizes strongly disagree, and 5 expresses strongly agree. The items are based on previous research, and we adjusted some items to be suitable for the Vietnamese business environment. The scale of business model innovation is measured by 9 observations adopted and adjusted following the study of Spieth & Schneider (2016). The scale of digital transformation was measured by 3 observations based on Weill and Aral's (2007) research. The social network scale was developed based on the synthesis of previous research and built by Nguyen Quang Thu et al (2020). However, the scale is not suitable because our research object is international business enterprises that have had a certain time of operation in the market, not just startups. For that reason, we removed variables related to startup factors from the scale and kept the remaining variables. The scale of human capital is based on the research of Rodchenko et al., (2021), which includes 6 observations, and the scale of dynamic capabilities is based on the research of Li & Liu (2014), which includes 15 observations.

**Table 2. Measurement Scale**

Construct	Measurement	References
Business Model Innovation (BMI)	BMI1: Target customers have changed	Spieth & Schneider (2016)
	BMI2: The products and services have changed	
	BMI3: The firm's position in the market has changed	
	BMI4: The firm's core competencies and resources have changed	
	BMI5: Internal value creation activities have changed	
	BMI6: Role and involvement of partners into the value creation process has changed	
	BMI7: Distribution has changed	
	BMI8: Revenue mechanisms have changed	
	BMI9: Cost mechanisms have changed.	
Digital Transformation (DT)	DT1: We are impulsing new business processes built on the foundation of technologies such as big data, analytics, cloud, mobile, and social media platforms	Weill & Aral (2007)
	DT2: We are integrating digital technologies such as social media, big data, cloud computing and mobile computing analysis to impulse changes	
	DT3: Our business is shifting to using digital technologies such as: big-data, cloud-computing, mobile-computing analysis, and social media platforms	
Social Networks (ML)	ML1: We have a good relationship with leaders of government at all levels	Nguyen Quang Thu et al. (2020)
	ML2: We have a good relationship with the staff of the Agency for Industrial Promotion	
	ML3: We have a good relationship with the staff of supporting organizations such as the General Department of Taxation, State Bank, Ministry of Industry and Trade, Ministry of Science and Technology, Social Insurance, Labor Confederation . . . , etc	
	ML4: We have a good relationship with our family, friends and colleagues	
	ML5: We have good relationships with universities and research institutes	
	ML6: We have a good relationship with the senior managers of corporate clients	
	ML7: We have a good relationship with the supplier's senior managers	
	ML8: We have a good relationship with our competitors' senior managers	
	ML9: We have a good relationship with the senior managers of the third party (e.g., client's partner, client's client, etc.)	

Human Capital (HC)	<p>HC1: We agree with the view that businesses must digitally transform today.</p> <p>HC2: We realize we have to develop ourselves and learn digital governance skills</p> <p>HC3: We realize that we have to have creative and intellectual skills</p> <p>HC4: We must be adaptive and flexible in using technologies</p> <p>HC5: We agree with the view that we must be able to use technology to participate in the digital transformation process</p> <p>HC6: We realize that digital culture helps us in the digital transformation process</p>	Rodchenko et al., (2021)
Dynamic Capabilities (DC)	<p>DC1: We can perceive environmental changes before competitors</p> <p>DC2: We often have meetings to discuss the market demand</p> <p>DC3: We can fully understand the impact of internal and external environment</p> <p>DC4: We can feel the major potential opportunities and threats</p> <p>DC5: We have perfect information management system</p> <p>DC6: We have good observation and judgment ability</p> <p>DC7: We can quickly deal with conflicts in the strategic decision-making process</p> <p>DC8: We can make timely decisions to deal with strategic problems under many circumstances</p> <p>DC9: We can remedy quickly to unsatisfactory customers</p> <p>DC10: We can reconfigure resources in time to address environmental changes</p> <p>DC11: Our strategic changes can be efficiently carried out.</p> <p>DC12: Good cooperation exists among different functions</p> <p>DC13: We help each other in strategic change implementation</p> <p>DC14: We have a proper awarding and controlling system.</p> <p>DC15: We can efficiently improve strategic change implementation</p>	Li & Liu (2014)

*Source: Synthesized and proposed by the research team*

### 3.3. Data analysis methodology

We use the SmartPLS version 4.0 program to evaluate the data. After conducting the above-described descriptive statistics on the samples that were collected, we moved on to assess measurement models, structural models, and test hypotheses with the following tests: Cronbach’s Alpha coefficient, composite reliability, convergent validity, discriminant validity Fornell & Larcker and Partial least squares structural equation modeling (PLS-SEM).

## 4. RESULTS AND DISCUSSION

### 4.1. Results

**Table 3. Reliability and convergent validity**

Construct	Item	Indicator Loadings	Cronbach’s Alpha	Composite Reliability (CR)	AVE
Business Model Innovation (BMI)	BMI1	0.869	0.953	0.960	0.727
	BMI2	0.893			
	BMI3	0.847			
	BMI4	0.841			
	BMI5	0.862			
	BMI6	0.850			

	BMI7	0.830			
	BMI8	0.814			
	BMI9	0.866			
Digital Transformation (DT)	DT1	0.877	0.856	0.912	0.776
	DT2	0.908			
	DT3	0.858			
Social Networks (ML)	ML1	0.790	0.939	0.949	0.674
	ML2	0.861			
	ML3	0.813			
	ML4	0.824			
	ML5	0.908			
	ML6	0.849			
	ML7	0.704			
	ML8	0.792			
	ML9	0.829			
Human Capital (HC)	HC1	0.848	0.926	0.941	0.728
	HC2	0.877			
	HC3	0.830			
	HC4	0.840			
	HC5	0.880			
	HC6	0.842			
Dynamic Capabilities (DC)	DC1	0.781	0.946	0.952	0.571
	DC2	0.834			
	DC3	0.764			
	DC4	0.765			
	DC5	0.717			
	DC6	0.767			
	DC7	0.791			
	DC8	0.701			
	DC9	0.775			
	DC10	0.733			
	DC11	0.708			
	DC12	0.731			
	DC13	0.753			
	DC14	0.792			
	DC15	0.708			

Source: Survey data analysis results until April 2023

Table 3 shows that the Cronbach’s Alpha coefficient of all variables is greater than 0.7, we accepted all constructs. AVE and CR are both greater than 0.5, which can prove the reliability and convergent validity of the scale. The results of CR and AVE show that all scales of the research meet the requirements of reliability and convergent validity. The results of data processing show that the loading coefficient of most of the observation variables is higher than 0.7 and none of the measured variables has a correlation smaller than 0.3. In addition, the scales in the research model all have convergent validity greater than 0.5, so the scales used in the research model can reach convergence and reliability standards.

**Table 4. Discriminant validity Fornell & Larcker**

	BMI	DC	DT	HC	ML
BMI	0.853				
DC	0.728	0.756			
DT	0.798	0.753	0.881		
HC	0.153	0.119	0.244	0.853	
ML	0.699	0.617	0.636	0.179	0.821

Source: Survey data analysis results until April 2023

Table 4 shows that the correlation coefficient of each variable with the remaining variables in the model is less than all the Square Roots of the AVE. Therefore, it can be concluded that all the scales of the research are suitable and have discriminant validity, according to Fornell and Larcker (1981).

**Table 5. Hypothesis testing results**

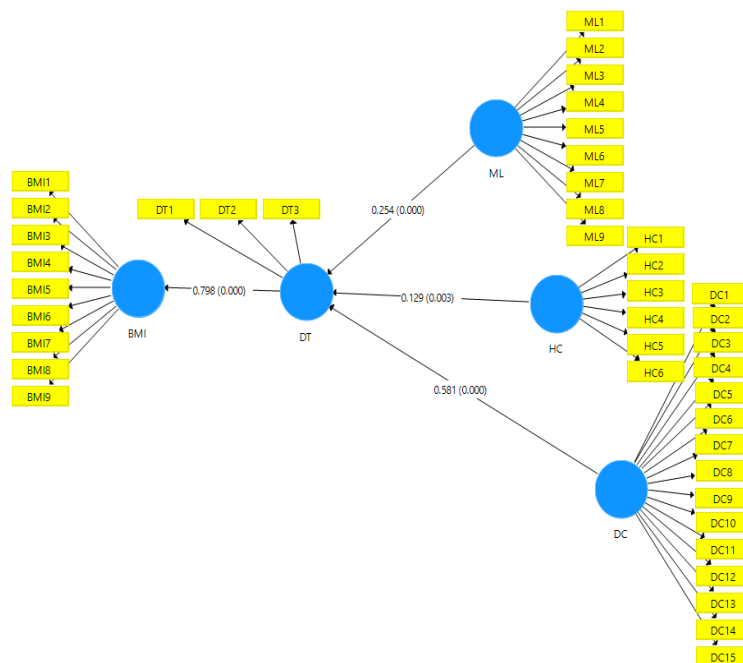
Hypothesis	Relationship	$\beta$	Standard Deviation	t value	p-value	VIF
H1	DT → BMI	0.798	0.042	18.980	0.000	1.000
H2	ML → DT	0.254	0.064	3.987	0.000	1.645
H3	HC → DT	0.129	0.043	2.983	0.003	1.033
H4	DC → DT	0.581	0.058	10.018	0.000	1.615
$R^2$		$R^2_{BMI} = 0.625; R^2_{DT} = 0.636$				
$f^2$		$f^2_{DT \rightarrow BMI} = 1.759; f^2_{DC \rightarrow DT} = 0.566$ $f^2_{ML \rightarrow DT} = 0.106; f^2_{HC \rightarrow DT} = 0.044$				
Stone- Geisser $Q^2$		$Q^2_{BMI} = 0.458; Q^2_{DT} = 0.480$				

Source: Survey data analysis results until April 2023

Table 5 shows that the VIF values of the variables are all under 3. Therefore, it can be concluded that the model does not have multicollinearity. The  $R^2_{BMI}$  value is 0.625 and the  $R^2_{DT}$  value is 0.636; both are greater than 0.25 and less than 0.75, which indicates that the BMI variable is related to the DT variable. Based on the value of  $f^2$ , it can be seen that the digital transformation (DT) factor has a great impact on business model innovation (BMI) with an  $f^2$  value of 1.759. The order of the degree of impact on the variable DT shows that the variable dynamic capabilities (DC) has the greatest influence and the strongest impact on the variable DT; otherwise, the social network (ML) variable and the human capital (HC) variable have weak impacts on the variable DT. The values of  $Q^2_{BMI}$  and  $Q^2_{DT}$  represent the predictive accuracy of business model innovation (BMI) and digital transformation (DT) at an average level.

After performing Bootstrapping with  $N = 5,000$  observations, the results show that the relationships between the factors of the research model are statistically significant due to  $p\text{-value} < 0.05$ . There are three variables respectively affecting the DT variable: the ML variable, the HC variable and the DC variable.

**Figure 2. The structural model after assessing the PLS-SEM**



*Source: Survey data analysis results until April 2023*

From the above results, all hypotheses proposed for the research model are accepted. That means that the digital transformation variable has a direct and positive impact on business model innovation. The three remaining variables, including social network, human capital and dynamic capabilities also have a direct and positive impact on the digital transformation variable.

#### 4.2. Discussion

In particular, digital transformation has a strong impact on business model innovation, contributing to increasing business performance through integration and transformation based on technology platforms such as big data, analytics, cloud, mobile and social media platforms,... Thanks to digital transformation, businesses can access convenient communication channels with customers, optimize their operating processes with technology, and build technology-based platforms to create new services such as sharing services, interactive experiences, etc.

The dynamic capabilities of businesses impact the success of digital transformation because digital transformation is not simply the application of new technologies, it is also related to how businesses use and leverage that technology to create value and innovate the business model. To be able to perform the digital transformation, enterprises must identify changes in the environment both inside and outside the business, predict risks and threats to be able to make timely strategies and decisions, have close coordination between departments, effectively manage information and quickly fix it in the customer care process.

For the social network of enterprises, having extensive relationships with authorities at all levels, such as leaders, local officials, state agencies, universities, friends, colleagues, or even suppliers and competitors, will give businesses a higher chance in the digital transformation process. Because social networks can create an environment of connection and interaction between individuals, organizations and resources in

an online community. Businesses can do business for their social network or share information and receive support from the community, etc. to help businesses improve and grow.

Although the human capital of the enterprise has a weaker influence than other factors, businesses also need to respect this factor. The company's employees must recognize the importance of digital transformation and have the skills to adapt to it, such as digital management skills, using technology skills, creativity and thinking.

From the contributions of the above inputs, the enterprise's ability to succeed in digital transformation will be improved, thereby changing its business model. Such changes may be present in the corporate governance process. To improve operational efficiency, businesses can change the way they operate, revenue, costs, partner roles, and core competencies, thereby changing the products and services provided to customers and target customers, leading to a change in the positioning of the business. The changes and adjustments of businesses, when supported by digital transformation, help businesses increase their competitiveness in the market.

Similar to Li & F. (2018); Bouwman, H., Nikou, S., & de Reuver, M. (2019); Pham Quang Hai, Phung Quang Phat, Do Hong Quan (2023); Nguyen Thi Nhu Quynh, Le Dinh Luan (2023); and many other related studies, this study also contributes to reaffirming that digital transformation is an inevitable trend in promoting business model innovation, contributing to increasing the competitiveness and operational efficiency of enterprises. In addition, the social network variable in the study has been proven to contribute to the success of digital transformation, so this will be useful data to contribute to the research on factors related to the digital transformation process, which very few domestic and foreign studies have done. Compared with the studies of Li, L., Su, F., Zhang, W., & Mao, J. Y. (2018), Tran, N. G., Nguyen, T. P. A., Nguyen, Q. T., & Ngo, Q. H. (2021), Santarelli, E., & Tran, H. T. (2013), Karimi, J., and Walter, Z. (2015), this study clarifies the impact of the firm's dynamic capabilities and human capital on efficiency of business operations, that is through the process of digital transformation in the business.

#### **4.3. Recommendations and policy implications**

After completing the research and drawing conclusions, the research team can come up with petitions to help businesses understand and make the right decisions in the future. Enterprises can invest in new technologies such as AI, IoT, blockchain, management software, sales websites... to increase productivity and work results. They can implement digital human resource training programs, improving programming skills, data mining and processing skills, information security, learning foreign languages... Moreover, they can enhance the quality of social networks on online platforms such as LinkedIn, Facebook... and actively take advantage of digital technology to increase competition, opportunities to access information, and support resources when needed. Lastly, enterprises can invest in dynamic capabilities to create business solutions, improve operational efficiency and secure solutions for business to adapt to markets and globalization around the world.

#### **4.4. Limitations and future developments**

In addition to its theoretical and practical contributions, the study still has certain limitations. The research sample space is limited and is not yet representative of the population, so the study can be improved by expanding the sample size to a larger range. Besides that, the data set of international business enterprises has not yet shown the specificity of each industry due to evaluation in many fields. Therefore, businesses need to do research in each specific field. In addition, this study only analyzes the impact of three factors, namely social networks, human capital, and dynamic capabilities, on digital transformation and business



model innovation. Therefore, the follow-up research can actively explore more resource-impacting factors. This not only improves the performance of international businesses but also enhances Vietnam's economic position in the global market.

## 5. CONCLUSION

The topic “Digital transformation and business model innovation in international business enterprises in Vietnam: A resource-based approach” is conducted with the main objective of researching digital transformation and business model innovation with an impact based on three resources: social networks, human capital, and dynamic capabilities. Our research team has demonstrated the importance of these resource factors. This serves to highlight how crucial it is to make the company's advantages known in order to coordinate the best resources, achieve sales targets, strengthen positions and take advantage of chances to engage more actively in the global supply chain. In the context of the world's economic and political fluctuations, businesses need to clearly define their goals and vision to ensure a balance between technology and business activities. Moreover, this improvement in the factors above will help businesses develop outstandingly and sustainably.

After more than six months of carrying out this scientific project, the research team has achieved important theoretical and practical values. The topic has overcome, tested, and shown the relationship among factors more clearly and intuitively than in previous studies. The research achieves the following objectives: analyzing the sample space and results of the evaluation scale; testing the model; and drawing conclusions and meanings for international business enterprises. Moreover, the study also presents solutions, analyzes the remaining limitations in order to achieve the goal of success in the process of argument change and business model innovation in particular, and contributes to the development of Vietnam's economy in the future.

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## ANALYZING THE COMPETITIVENESS OF VIETNAM'S TUNA EXPORT INDUSTRY: FROM FOUR DETAILED INDUSTRY CODES TO THE WHOLE INDUSTRY

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**ABSTRACT:** *This study was conducted to determine the export competitiveness of Vietnam in tuna products compared to other competitors in the world's largest tuna-importing regions in the period 2007-2019. The analysis of 4 large tuna industry codes (0302, 0303, 0304 and 1604) to give an overall picture of the export tuna industry. From there, a number of solutions are proposed to promote the export competitiveness of this industry as a whole. To conduct the study, secondary data provided by ITC were used. In addition, to analyze competitive advantage, the study used the RCA (Revealed Comparative Advantage) and the CMS (Constant Market Share). After analyzing, it can be seen that in most markets, Vietnam holds a certain competitive advantage. Specifically, tuna code 0304 was the item more and more prior. However, there is still no stability in maintaining the RCA index. Meanwhile, although there has been an improvement in export quality and volume, the lack of allocation to high-demand markets explains why the CMS index in many periods remains negative. In conclusion, although there is a lot of potential in this field, Vietnam may have not really invested in exporting tuna.*

**Keywords:** *tuna, export competitiveness, RCA, CMS.*

### 1. INTRODUCTION

The tuna export industry is one of the key sectors in Vietnam's trade-oriented economy, accounting for 34% of around \$1 billion in total seafood exports in 2021 (VASEP). The tuna worldwide industry in 2022 reached a total export value of up to 13.9 billion USD (Trademap). Vietnam remained a positive tuna export value over the past 15 years. In 2007 the total value of Vietnam's exports to the world was only 1.7% and until 2022, Vietnam accounted for nearly 5% of the total value of export tuna to the world (Trademap). This is achieved through favorable geographical location, an abundant labor force with rich experience. Indeed, exports to major markets in the world such as the EU, Japan, have also been boosted thanks to the free trade agreements that Vietnam has signed in recent times, such as CPTPP, EVFTA. The tariff preferences as agreed in the Agreements have created a driving force to promote Vietnam's tuna exports to these markets. However, according to the evaluation of the Vietnam Association of Seafood Exporters (VASEP), Vietnam's seafood export industry has generally achieved results that do not correspond to the available potential.

To better compare the issue that Vietnam has not yet exploited its advantages and geographical potential, this study compares the data between Southeast Asia, fishing in the same sea. Based on an overview comparative study of competitive advantages and export products among 6 countries in Southeast Asia (Indonesia, Malaysia, Philippines, Singapore, Thailand and Vietnam) (Jayadi & Aziz, 2017), Indonesia, Vietnam and Thailand have similar advantages, but Vietnam's tuna export value is only about 35% of Thailand's and is still lower than Indonesia's (Trademap, 2021). In terms of the national economy such as tuna exports, the competitiveness of a country will play a huge role. "The competitiveness of a country is of great importance to the development of the national economy" (Ahasanul Haque, 2013). Therefore,

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a proper assessment of competitiveness will be essential for Vietnam's tuna export industry, as previous scholars have assessed the competitiveness of the tuna export industry (Uyen Vo Thi Le, 2022).

Currently, the number of studies showing the competitiveness of the tuna industry in the world and in Vietnam is few and has not met the information needs commensurate with the billion-dollar industry. The number of research papers on world tuna exports is quite limited, since 2003 on the tuna industry in the world seafood market (Paquette, P. (2003)), development of the tuna industry as recently as 2010 (Miyake, 2010). Meanwhile, the number of research papers on the competitiveness of Vietnam's tuna industry is also less than that of Indonesia and Thailand. Thailand has many in-depth research papers on the tuna industry (G. J, 1987; Hudgins, L. L, 1987; Kalayanakupt, K, 2001). In Indonesia, research is also ongoing (Apridar, 2014; Hidayati & Masyhuri 2015; Suhana, Adrianto & Fahrudin, 2016). In Vietnam, a number of research papers have mentioned but not specified the whole tuna industry, only analyzed and compared the competitiveness of a few specific tuna species, such as yellowfin tuna (Le Thi et al, 2022), or yellowfin and bigeye tuna (NDH Thu, Cao Le, L.T.Minh, Nang Thu Tran & Lebailly, 2021). Besides, the research paper is recently outdated, such as the overview of Vietnam's tuna industry made since 2005 (A.D. Lewis, 2005). The lack of studies on the competitiveness of Vietnam's tuna industry will easily lead to errors in assessment such as overestimating or underestimating the ability of Vietnam's tuna industry, leading to not being able to effectively exploit its potential.

The first objective of the study is to compare the current position and competitiveness of Vietnam's tuna industry in major import markets such as the US, Japan, the EU, ASEAN, the Middle East to other players. Thereby helping to determine the position of Vietnam and others in the international tuna market. Thereby, it gives clearer predictions about the future competitiveness of Vietnam's tuna industry as well as untapped strengths and weaknesses that need to be overcome.

This study was conducted by using RCA, CMS measurement methods to assess the competitiveness of Vietnamese tuna with data from 2007-2019 by comparing these indicators with tuna exporting countries in the same segment as Vietnam. Competitors include Thailand, Indonesia, Ecuador, Taipei and markets include the US, Japan, the EU, ASEAN, the Middle East.

## **2. LITERATURE REVIEW**

This study analyzes four tuna products: frozen tuna, fresh or chilled tuna, prepared or preserved tuna and filets of tuna. The HS codes used to identify them are 0302; 0303; 0304; and 1604 respectively.

The competitiveness of a country facilitates economic growth, investment, industrial development and an improved quality of life. However, the definition of competitiveness is still a multidimensional concept. There are many studies that have addressed this approach. Among them, the most accepted definition is: "The degree to which a country can, under free and fair market conditions, produce goods and services that meet the test of international markets while simultaneously maintaining and expanding the real incomes of its people in the long term" (Stevanset et al, 2012).

### **2.1. Revealed Comparative Advantage (RCA)**

Traditional economic theory defines competitiveness based on the concepts of absolute advantage as defined by Adam Smith (1776) and comparative advantage as defined by David Ricardo (1817). This theory is measured by basic indicators such as productivity, price and value. However, Balassa (1965) recognized the limitations associated with the classical theory of comparative advantage. To address these limitations, he introduced the RCA, partly based on Liesner's Relative Export Performance Index (1958), designed to measure the impact of the removal of trade barriers. The RCA reveals a country's competitive advantage

through examination of trade data, demonstrating the impact of cost and non-price factors. There is much criticism and concern about the trade-distorting effects of government intervention and the inability to identify sources of comparative advantage. Despite this, scholars maintain that the RCA, when used with caution, is a useful measure of comparative advantage that can highlight patterns of specialization. Many researchers (Balassa, Citation 1989; Batra & Khan, Citation 2005; Hinloopen & Van, Citation 2001; Laursen, Citation 1998) used this index to estimate export competitiveness and comparative advantage for commodities with diverse datasets across countries. Kulapa Supongpan Kuldilok, P.J. Dawson, John Lingard (2013) examined the RCA indicators of the competitiveness of Thailand's tuna exports for the period 1996-2006. Fauzian Akmal Ramli, Rossanto Dwi Handoyo, Abdul Rahim Ridzuan & Mohamad I.Md Razak (2020) also used the RCA index and its variation to analyze the comparative advantage of the Indonesian tuna industry, thereby identifying factors in Indonesia's decision to export tuna. Zahra Saki and Marguerite Moore (2018) also examined the revealed comparative advantage for US textiles by analyzing the RCA.

## **2.2. Constant Market Share (CMS)**

Another commonly used method to explore the export potential of goods over a period of time for a given country is constant market share (CMS), which is an index widely used due to ease of application and visual appeal. This model is of enormous significance for examining component contributions to fluctuations in export turnover of a major product or set of commodities in export markets. The first idea of this approach was studied by Tyszynski (1951), who suggested that the export structure of a given country's goods affects its own global export performance even if other factors change.

In a study by Maheran and Muhammad (2008), the CMS approach was applied to study the level of competition in the Malaysian electrical and electronics industry over the period from 1990-2004. Tran et Al (2009) also used the CMS method to determine Vietnam's exports to the EU in the period 1997-2004. The results showed that the main causes behind Vietnam's competitive export performance were its relatively good universal trade as well as its good market posture. Hasanul Haque et Al (2013) also used the RCA and CMS indexes to identify the market prospects and challenges of exporting furniture from Malaysia. Muhammad Abdul Kamal (2020) analyzed Pakistan's export performance and trade potential in Central Asia based on CMS. In Vietnam, studies by Vo Thanh Danh (2008), Ngo Thi My (2017) applied the CMS model to analyze fluctuations in export turnover of agricultural products generally and some specific agricultural products in different regions markets.

Such studies provide valuable information on the competitive benefits and competitive positions of nations in specific export sectors. By using competitiveness measurement models (RCA and CMS), researchers can identify the sectors or products of a country that have a comparative advantage in exporting in the international market. Meanwhile, it examines the competitiveness of the products and helps to identify the components that affect export management and the competitiveness of that country. From these, the studies highlight the prospects and market challenges that industries and countries face in their export activities. In this way, policymakers can develop targeted policies and measures to enhance export competitiveness, promote industry growth and efficiently allocate resources.

## **3. RESEARCH METHOD**

### **3.1. Revealed Comparative Advantage (RCA)**

RCA is used to identify the shift in a particular country's exports with regard to its competitive advantage. However, a country's comparative advantage cannot be directly measured because such measures require relative prices before intangible transactions. Accordingly, the original Balassa (1965) RCA, which has

been adjusted for a range of measures, is the ratio of a country’s exports of a product to its total exports, to the ratio of world exports of that product to total world exports (Kulapa Supongpan Kuldilok, P.J. Dawson & John Lingard, 2013). The RCA of country i when exporting product j is:

$$RCA_{imj} = \frac{X_{ij}/X_i}{X_{mj}/X_m}$$

Where:

- $X_{ij}$  : Country i’s export of commodity j
- $X_i$  : Country i total commodities export to world
- $X_{mj}$  : Total import value/volume of commodity j in country m
- $X_m$  : Total import value/volume of country m.

Table 1: Evaluation the competitiveness of the export industry through RCA index

ID	Groups	Degree of comparative advantage
1	$0 \leq RCA \leq 1$	There is no comparative advantage
2	$1 \leq RCA \leq 2$	There is a low comparative advantage
3	$2 \leq RCA \leq 4$	There is an average comparative advantage
4	$RCA > 4$	There is a high comparative advantage

Source: Hinlopen, 2001

### 3.2. Constant Market Share (CMS)

A country’s exports can be classified by applying the CMS model by decomposing export growth into their respective parts (including Standard World Growth Effect, Commodity Composition Effect, Market Distribution Effect and Competition Effect). Thus, the overall CMS identifies a real change in the focus country’s exports between the two time periods. The CMS model is used to describe a country’s export growth. Here, the export performance of a particular country is compared with the “world average”. Currently, there is not an exact statement about the CMS formula and we have followed the “Export of furniture product from Malaysia: Market prospects and challenges” research paper formula. The CMS model used in this study can be performed as follows:

$$\sum_{i=1}^n (q_i^1 - q_i^0) = \underbrace{\sum_{i=1}^n r \cdot q_i^0}_{\text{World Demand Effect}} + \underbrace{\sum_{i=1}^n [r_i q_i^0 - r q_i^0]}_{\text{Commodity Composition Effect}} + \underbrace{\sum_{i=1}^n \sum_{j=1}^m r_{ij} q_{ij}^0 - \sum_{i=1}^n r_i q_i^0}_{\text{Market Distribution Effect}} + \underbrace{\sum_{i=1}^n (q_i^1 - q_i^0) - \sum_{i=1}^n \sum_{j=1}^m r_{ij} q_{ij}^0}_{\text{Competitiveness Effect}}$$

Where:

- $r$  : Proportionate change in total world exports in aggregate from initial time period (0) to terminal time period (1);
- $r_i$  : Proportionate change in world exports of the  $i^{th}$  commodity in aggregate from initial time period (0) to terminal time period (1);
- $r_{ij}$  : Proportionate change in world exports of commodity  $i$ , to market  $j$  in aggregate from initial time period (0) to terminal time period (1);
- $q_i^0$  : Total exports by the focus country of commodity  $i$  in the initial period;
- $q_{ij}^0$  : Total export by the focus country of commodity  $i$ , to the  $j^{th}$  market in the initial period;
- $q_i^1$  : Total export by the focus country of commodity  $i$ , in the terminal period.

### Data

First, we determined the HS codes of tuna that have been exported around the world. There are four major codes: 0302 (31, 32, 33, 34, 35, 35, 36, 39); 0303 (41, 42, 43, 44, 45, 46, 49); 0304 (87); 1604 (14) about tuna. Next, for the time frame, we chose the period from 2007-2019, because this is a stable period without incidents that seriously affect the global market like COVID-19. In addition, based on the statistics of the trade map, we selected five markets that were considered potential for exporting tuna, including the US, Japan, the EU, the Middle East and ASEAN. In these markets, we select the typical countries for each group of tuna export capacity. For example, in the EU, there will be exporting countries like Vietnam, Ecuador, Thailand and Indonesia. In each country, the data on HS codes will be determined from year to year based on continuously updated data on Trademap. We will rely on the above data to calculate the RCA, CMS for each country; each market is then combined with a number of factors for the conclusions.

## 4. RESULTS AND DISCUSSION

### 4.1. Results

#### 4.1.1. Total HS codes

##### RCA

The market share of Vietnamese tuna exports to the US during 2007-2019 had a positive average value of 9,91%. Vietnam was the second largest exporter to the US when compared to Thailand, Indonesia and Ecuador, which each had an average market share value in the US of 30,35%, 7,72% and 7,03%, respectively. Four exporting countries captured 55,01% of the US tuna export market share. This reflects that Vietnam was an important tuna exporting country for the US.

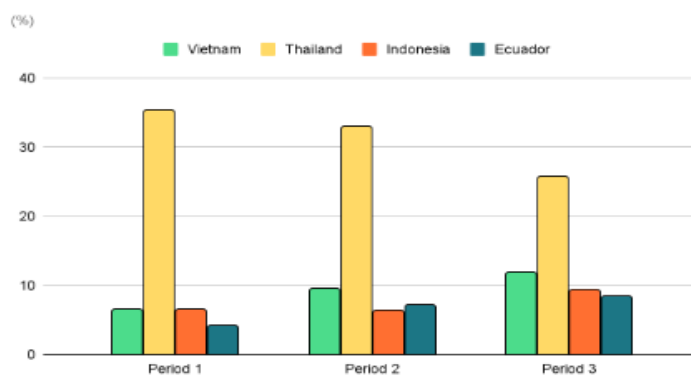


Figure 1. Percentage of market share of the four tuna exporting countries in US

The competitiveness of tuna exports to the US is determined using the RCA method. According to the results of RCA, Vietnam had export competitiveness to the US because of its RCA value during 2007-2019  $>1$ , with an average value of 3,59. Comparing the RCA value of Vietnam to Thailand, Indonesia and Ecuador which had an average RCA value of 13,77; 4,43 and 51,59 respectively, Vietnam is the lowest. Therefore, Vietnam had the lowest competitiveness level for tuna exports. However, Vietnam had the second highest export value to the US.

During 2007-2019, the RCA value of Vietnam fluctuated around 3-4. Whilst Ecuador increased sharply, Indonesia was quite stable and Thailand declined slightly; the value of tuna exports from them to the US rose. This indicates that the US market was opening up tuna imports from these countries. However, the RCA value of Vietnam did not increase rapidly. This may be explained that Vietnam focused on developing but had not mainly aimed to export tuna to the US.

*Table 2: RCA of total tuna export to the US market*

	HS	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	Total	4,36	3,44	3,04	4,05	4,01	4,14	3,99	3,79	3,57	3,33	3,08	2,80	3,08
Indonesia	Total	4,43	4,05	3,92	3,41	3,67	4,21	4,63	4,49	4,61	4,55	4,91	4,85	5,81
Ecuador	Total	41,24	48,19	36,51	30,49	42,27	41,86	52,64	53,49	53,98	60,75	74,32	69,01	65,86
Thailand	Total	15,59	18,14	14,76	13,77	15,33	13,73	14,19	13,80	12,64	12,38	11,32	11,42	11,90

In Japan, the RCA value of Vietnam fluctuated around 1 and even <1 after 2015. This reflects that the competitive advantage of Vietnam’s tuna exports to Japan was unstable. Besides, from 2015-2019, Vietnam did not have tuna export competitiveness. The RCA value of Vietnam in Japan was around 3 times smaller on average than in the US and so was that of Thailand. This indicates that Vietnam and Thailand were not focusing their tuna exports on Japan but on other countries and areas with more potential.

*Table 3: RCA of total tuna export to Japan market*

	HS	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	Total	1,05	0,96	0,79	1,16	1,19	1,19	1,28	1,15	0,92	0,77	0,76	0,78	0,80
Thailand	Total	3,75	5,08	3,84	3,94	4,54	3,96	4,56	4,18	3,25	2,87	2,79	3,19	3,11
Taipei, China	Total	0,91	1,45	0,97	1,09	1,33	1,26	1,24	1,14	0,89	0,85	0,93	0,99	0,94

In the EU, Vietnamese RCA value during 2007-2019 was >1 (average value of 4,08). This reflects that Vietnam had export competitiveness to the EU. Comparing the average RCA value of Vietnam to Thailand, Indonesia and Ecuador, which had an average value of 15,61; 4,96 and 57,27 respectively, Vietnam was the lowest. This reflects that Vietnam had a lower competitiveness level of tuna export to the EU than Thailand, Indonesia and Ecuador. Vietnam’s RCA value tended to decrease gradually from 2012, reached its bottom of 2,94 (2007-2019), then only recovered to 3,14 in 2019. This shows that the competitive advantage of Vietnam’s tuna exports was still unstable while Ecuador’s RCA value continuously increased and the RCA values of Indonesia and Thailand fluctuated slightly.

Interestingly, all above countries had RCA values during 2007-2019 in the EU higher than in the US. This reflects that they had a higher competitiveness level of tuna export to the EU than in the US. However, comparing export value annually during 2007-2019, the tuna export value of Vietnam to the EU lessened. This reflects that Vietnam owned less market share in the EU than in the US.

*Table 4: RCA of total tuna export to the EU market*

	HS	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	Total	5,09	3,86	3,57	5,35	4,66	5,36	4,28	4,15	3,89	3,66	3,13	2,94	3,14
Indonesia	Total	5,17	4,54	4,60	4,51	4,26	5,45	4,97	4,91	5,03	5,00	4,99	5,09	5,92
Ecuador	Total	48,09	54,09	42,90	40,28	49,10	54,14	56,52	58,47	58,90	66,77	75,57	72,46	67,20
Thailand	Total	18,18	20,36	17,34	18,19	17,81	17,76	15,23	15,09	13,79	13,61	11,51	11,99	12,14



The tuna value of Vietnam's exports to the Middle East was small, but the average RCA value (4,08) was higher than that of the US. This shows that Vietnam's value of competitive advantage was in the mid-high range in exporting tuna to the Middle East, similarly to its competitor, Thailand. However, Vietnam's RCA value in this market tended to decrease from 2013-2019. The RCA value in ASEAN was even smaller than in the Middle East, with an average value of 1,85. This shows that Vietnam has a low but stable competitive advantage in exporting tuna to the ASEAN market.

*Table 5: RCA of total tuna export to the Middle East market*

	HS	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	Total	5,57	3,99	3,16	3,92	3,89	4,60	4,63	4,18	3,94	2,94	3,38	2,61	2,62
Thailand	Total	19,89	21,05	15,34	13,32	14,86	15,24	16,45	15,20	13,95	10,95	12,42	10,63	10,12

*Table 6: RCA of total tuna export to the Asean market*

	HS	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	Total	1,75	1,21	1,46	1,96	1,74	2,05	2,03	2,34	2,55	1,75	1,62	1,62	1,91
Taipei, China	Total	1,52	1,82	1,78	1,84	1,95	2,17	1,96	2,32	2,48	1,92	1,99	2,04	2,23
Japan	Total	0,16	0,12	0,12	0,12	0,12	0,12	0,15	0,17	0,16	0,09	0,11	0,15	0,15

According to RCA value, in the EU, US and Middle East markets, Vietnam had a mid-high competitive advantage. Moreover, in general, Vietnam still had a low competitive advantage in the ASEAN and had no competitive advantage in Japan. In addition, in these markets, Vietnam had the highest competitive advantage in exporting tuna to the EU market. Concluding that, the above markets were all potential tuna export markets of Vietnam, especially the EU market, although there were still fluctuations.

### **CMS**

Using the CMS method to further examine Vietnam's tuna exports through markets around the world. The first 2 CMS elements, Standard World Growth Effect and Commodity Composition Effect, were the same in all markets and had positive value during 2007-2019. This reflects that the impact of global demand put direct pressure on Vietnam's tuna exports, causing a decline in tuna yield. This value declined from period I-II shows that the world tuna consumption continued to increase. That put pressure on Vietnam to produce more to meet world demand. However, from period II-III, this value increased by 4,6 times, showing that the value of influence of world demand increased strongly on Vietnam. The positive value of Commodity Composition Effect during 2007-2019 reflects the high market demand for this product. From period I-II, this value increased more than 2 times, showing that consumers were more interested in Vietnamese tuna exports. But after, this value decreased, illustrating that consumers' preference for Vietnamese tuna had decreased significantly.

**Table 7: Standard World Growth Effect and Commodity Composition Effect of tuna in total**

Period	Standard World Growth Effect	Commodity Composition Effect
2007-2010	6456,50	103,81
2011-2014	3410,60	21841,84
2015-2019	15938,24	13618,69

Another factor that strongly influences Actual Export Growth is Market Distribution Effect. This factor reflects Vietnam’s response to the increase in demand occurring in the importing country. During 2007-2019, its value was negative in 5 markets. This reflects that Vietnam had not properly allocated tuna exports to these markets. This may be because instead of allocating to markets with high import demand, Vietnam focused on low-potential countries. Moreover, in the US, Japan, EU and Middle East markets, Market Distribution Effect tended to decrease during 3 periods. Although from period II-III, in the ASEAN market, its value slightly increased. Therefore, it shows that Vietnam did not have an improvement in the allocation of tuna value to these markets.

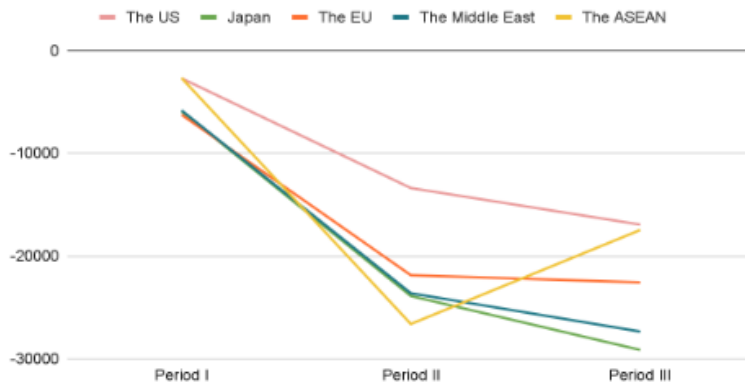


Figure 2. Market Distribution effect of Vietnam’s tuna in five imported markets.

The last factor is the Competitiveness Effect. Its value was positive for 5 markets during 2007-2019. This shows that Vietnam focused on both increasing the value and quality of exported tuna. In addition, this value tended to increase sharply in periods I-II and decreased slightly after that. This proves Vietnam had improved its tuna quality to meet the needs of the importing countries.

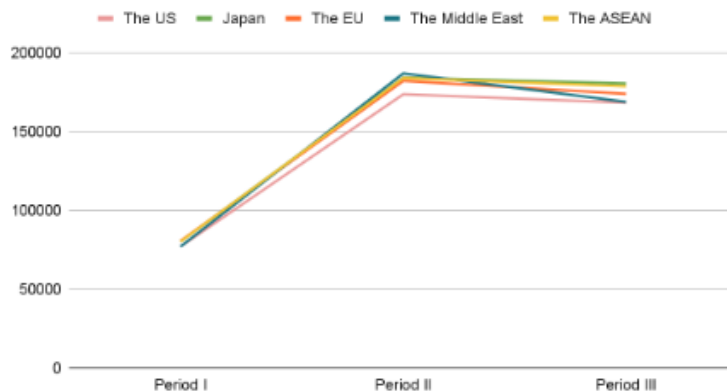


Figure 3. Competitiveness effect of Vietnam’s tuna in five imported markets.

#### 4.1.2. Detailed HS codes

##### a) 0302

##### RCA

In the US, the RCA values of Vietnam, Indonesia, Ecuador and Thailand were 5,01; 0,00; 3,05; and 0.76 in 2007, respectively. Obviously, Vietnam had the highest competitive advantage. However, during 2008-2012, Ecuador moved to the top with an average RCA value of 7,71, while Vietnam dropped to the second rank with an average RCA value of 4,42. This shows that Vietnam had gradually lost its competitive

advantage over its rivals. Indeed, since 2012, Vietnam's RCA value showed a downward trend. Then, after 2015, the RCA value was <1. This reflects that Vietnam had no competitive advantage since 2015.

*Table 8: RCA of 0302 tuna export to the US market*

	HS	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	0302	5,01	2,79	4,02	4,87	5,01	5,44	2,08	1,10	0,48	0,09	0,14	0,12	0,10
Indonesia	0302	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Ecuador	0302	3,05	5,85	9,47	8,09	6,66	8,50	8,66	4,82	7,56	8,42	6,97	9,89	9,74
Thailand	0302	0,76	0,43	0,51	0,55	0,37	0,32	0,77	1,03	0,97	0,88	0,18	0,06	0,04

In general, the RCA value of 0302 Vietnamese tuna in the Japan market was smaller than in the US market. Moreover, only in 2007, 2011 and 2012, the RCA value of Vietnam was >1 while the RCA value of Thailand was <1 during 13 years. This shows that Vietnam and Thailand had almost no competitive advantage.

*Table 9: RCA of 0302 tuna export to Japan market*

	HS	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	0302	1,07	0,63	0,70	0,99	1,19	1,33	0,65	0,41	0,19	0,03	0,06	0,06	0,06
Thailand	0302	0,16	0,10	0,09	0,11	0,09	0,08	0,24	0,38	0,39	0,30	0,08	0,03	0,02
Tabei, China	0302	0,05	0,84	0,63	1,27	1,63	1,67	1,93	1,84	1,49	1,26	1,28	1,06	0,73

Vietnam's RCA value was higher in the EU than in the US. From 2007-2012, Vietnam had a high competitive advantage in exporting 0302 tuna with an average RCA value of 22,30. However, from 2013 onwards, Vietnam's RCA value decreased sharply and after 2016 this value <1. So, Vietnam had gradually lost its competitive advantage.

*Table 10: RCA of 0302 tuna export to the EU market*

	HS	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	0302	23,31	15,77	20,09	26,62	22,18	25,83	10,10	5,20	2,11	0,35	0,52	0,49	0,41
Indonesia	0302	29,28	37,77	30,16	33,56	18,33	15,97	16,40	14,41	9,45	9,37	4,84	3,27	2,77
Ecuador	0302	14,21	33,11	47,35	44,18	29,49	40,38	41,99	22,72	33,57	34,31	25,93	39,60	39,22
Thailand	0302	3,56	2,46	2,55	3,00	1,65	1,50	3,72	4,86	4,32	3,60	0,67	0,22	0,14

In the Middle East and ASEAN markets, in the period 2007-2012 with the average RCA values of 61,09 and 27,26 respectively, it shows that Vietnam had a higher competitive advantage than in the EU market. However, there was a downward trend after 2012. This shows that Vietnam had not focused on the 0302 tuna in these markets.

*Table 11: RCA of 0302 tuna Vietnam in Middle East and ASEAN*

	HS	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
The Middle East	0302	77,21	46,79	54,60	62,05	72,92	52,97	12,38	8,44	3,51	0,93	1,48	1,06	0,76
Asean	0302	37,10	25,47	24,21	20,56	28,57	27,68	16,73	7,15	2,01	0,43	0,64	0,90	0,63

In conclusion, the RCA values all tended to decrease strongly after 2012 and generally <1 from 2016-2019. This shows that Vietnam had no competitive advantage for the 0302 tuna from 2016-2019.

Especially in the Japanese and the US markets, Vietnam even lost the competitive advantage of this industry earlier, in 2013 and 2015 respectively.

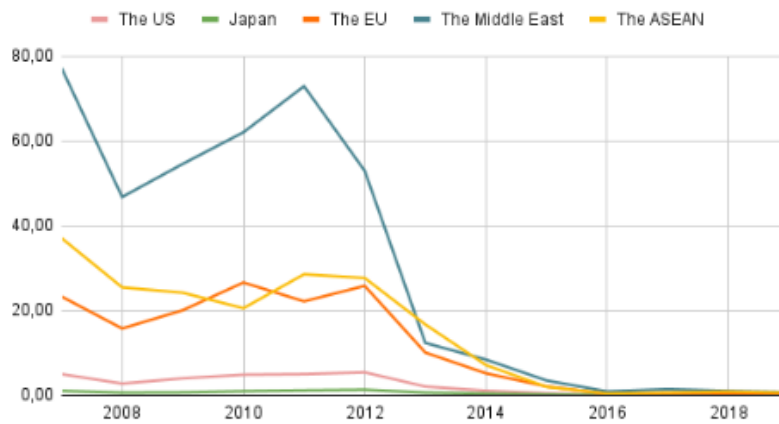


Figure 4. RCA of 0302 tuna Viet Nam in five imported markets.

**CMS**

Standard World Growth Effect has positive value during 2007-2019. This reflects that the world demand may put direct pressure on Vietnam’s 0302 tuna exports. Moreover, this value declined significantly shows that the world’s 0302 tuna consumption continues to increase. The negative value of Commodity Composition Effect during 2007-2019 reflects that Vietnamese 0302 tuna exports are not favored by consumers around the world. From period I-II, this value decreased sharply. After that, although this value increased, it is still negative, indicating that consumer’s demand for Vietnam 0302 tuna is still poor.

Table 12: Standard World Growth Effect and Commodity Composition Effect of tuna HS 0302

Period	Standard World Growth Effect	Commodity Composition Effect
2007-2010	1554,30	-1490,15
2011-2014	665,88	-3644,96
2015-2019	338,62	-334,62

Market Distribution Effect of all 5 markets had positive values in period II, while period I and III were unstable. Indeed, Market Distribution Effect from period I-II tended to increase and then in II-III decreased. This shows that Vietnam had a proper distribution of 0302 tuna in these markets in period II.

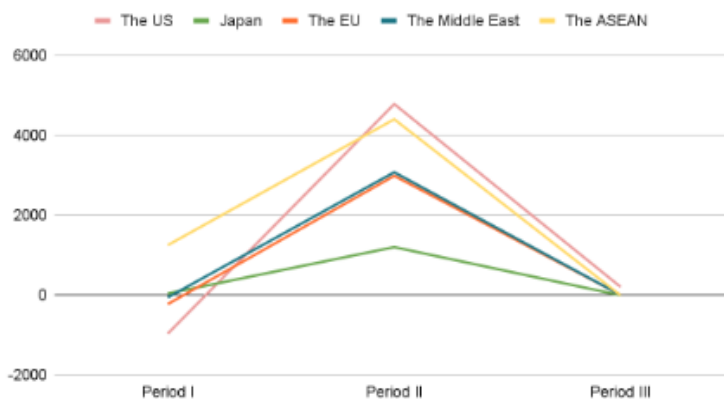


Figure 5. Market distribution effect of 0302 tuna Viet Nam in five imported markets.

Competitiveness Effect, although having different values in each market, tended to remain the same. In period I, the positive value showed that Vietnam focused on both increasing the value as well as the quality of export 0302 tuna. Obviously, this effect decreased sharply from period I-II and increased slightly from period II-III. Although Vietnam had improved the quality of its 0302 tuna from period II-III, it had not yet focused much.

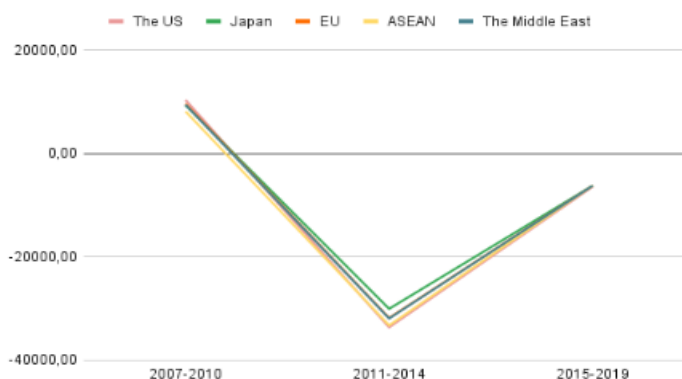


Figure 6. Competitiveness Effect of Vietnam tuna HS 0302 at five imported markets

b) 0303

RCA

In the US market, for tuna code 0303, Vietnam had RCA values >1 during 2007-2019 with an average value of 3,07. Whilst, Indonesia and Ecuador had higher average values, with 8,39 and 13,93 respectively. Vietnam’s export of tuna 0303 in general showed a downward trend, especially 2012-2014 and 2016-2019 and tended to fluctuate in other years. This shows that Vietnam was gradually no longer focusing on tuna 0303 in this market.

Table 13: RCA of 0303 tuna export to US market

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Vietnam</b>	1,90	1,64	1,89	6,15	5,90	4,61	2,12	1,28	2,22	1,73	1,56	1,04	7,83
<b>Indonesia</b>	4,27	4,75	4,15	4,76	6,13	10,75	9,55	7,37	5,89	5,19	8,71	4,89	32,71
<b>Ecuador</b>	4,03	11,11	20,05	20,11	22,11	7,20	10,47	14,39	8,30	5,69	15,50	18,44	23,72
<b>Thailand</b>	1,83	2,50	2,01	0,97	1,61	1,91	0,65	0,94	0,81	0,90	1,68	1,46	7,76

The RCA value in the EU market of tuna 0303 was higher than in the US market, with the average value being 3,78. This shows that Vietnam had an average competitive advantage. Meanwhile, Ecuador held an average RCA value of up to 18,40, much higher than Vietnam. Along with the instability in the export value of tuna 0303, Vietnam’s RCA value was also gradually decreasing, especially in 2015-2018. This reflects that Vietnam was no longer focused on exporting this code.

Table 14: RCA of 0303 tuna export to EU market

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Vietnam</b>	3,63	2,70	3,69	10,39	7,92	5,62	2,60	1,77	3,51	2,26	1,86	1,37	1,78
<b>Ecuador</b>	7,72	18,34	39,07	33,99	29,69	8,77	12,87	19,87	13,14	7,41	18,51	24,47	5,39

There were surprising similarities in the Japanese and ASEAN markets. Tuna 0303 to these markets from Vietnam lost its competitive advantage with the average RCA value of 0,21. However, the biggest rival in these markets, Taipei, also held an average RCA value at only 1,84 and 1,78, respectively. The RCA of Vietnam in the Japanese market increased slightly while decreasing in ASEAN. This can be concluded that in these markets, Vietnam had completely lost its competitive advantage without improving.

*Table 15: RCA of 0303 tuna export to Japan market*

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	0,15	0,13	0,15	0,44	0,43	0,37	0,23	0,12	0,21	0,15	0,14	0,11	0,14
Thailand	0,15	0,20	0,16	0,07	0,12	0,15	0,07	0,09	0,08	0,08	0,15	0,16	0,14
Taipei, China	1,42	2,07	1,35	1,25	1,56	2,21	2,36	1,92	1,69	1,58	1,87	2,31	2,36

*Table 16: RCA of 0303 tuna export to Asean market*

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	0,17	0,11	0,17	0,51	0,44	0,32	0,17	0,13	0,24	0,16	0,14	0,10	0,12
Taipei, China	1,56	1,69	1,57	1,44	1,61	1,93	1,68	2,10	1,90	1,65	1,89	2,05	2,11
Japan	0,14	0,10	0,09	0,10	0,10	0,09	0,13	0,14	0,10	0,05	0,08	0,11	0,09

In the Middle East, Vietnam’s RCA value during 2007-2019 was >1 with an average value of 3,59. Competitor Thailand had an average RCA value of 3,45. However, during 2013-2016, Thailand’s RCA index was <1. This shows that the potential of Vietnam in this market was quite large. However, export value from Vietnam seemed to decrease since 2012. This may be because Vietnam had started to focus on exporting other majors.

*Table 17: RCA of 0303 tuna export to The Middle East market*

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	3,59	3,90	3,03	5,66	6,97	7,14	2,73	1,17	2,61	1,54	1,71	1,54	1,61
Thailand	3,45	5,95	3,22	0,89	1,90	2,97	0,83	0,86	0,96	0,79	1,84	2,17	1,60

In short, RCA values tended to decrease in the US, EU and Middle East and even had <1 value in ASEAN and Japan. It can be seen that tuna code 0303 was no longer a priority export product of Vietnam.

### **CMS**

Analyzing tuna 0303, the Standard World Growth Effect value of Vietnam increased during 2007-2019. This shows that the demand for tuna 0303 decreased. While Commodity Composition Effect fluctuated. From period I-II, its value increased sharply, but when entering period III, it started to decrease. This reflects that consumers’ interest in tuna code 0303 of Vietnam had fluctuated.

*Table 18: Standard World Growth Effect and Commodity Composition Effect of tuna HS 0303*

Period	Standard World Growth Effect	Commodity Composition Effect
2007-2010	593,40	-217,39
2011-2014	790,35	4912,00
2015-2019	1591,92	1441,13

Market Distribution Effect fluctuates strongly. In the ASEAN market, it recorded a positive value in period I, then decreased in period II and increased again in period III. In the remaining markets, its value was negative during 2007-2018. This reflects that Vietnam was gradually losing its advantage due to improper output allocation when exporting tuna 0303.

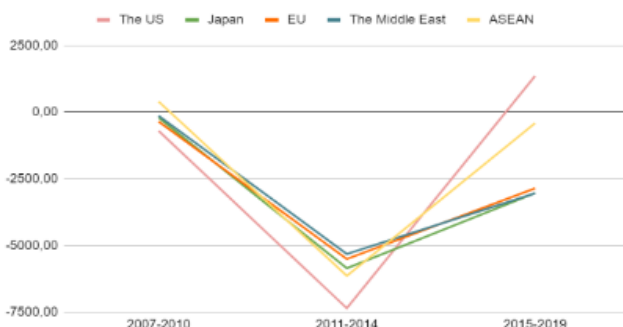


Figure 7: Market Distribution Effect of Vietnam tuna HS 0303 in five imported markets

When analyzing Competitiveness Effect, there is a common trend during 3 periods in all markets: a positive value in period I, plummeting to a negative value in period II and slightly increasing in period III. This shows that the quality of tuna 0303 of Vietnam when exported to the US, Japan, EU, ASEAN and Middle East is given little attention.

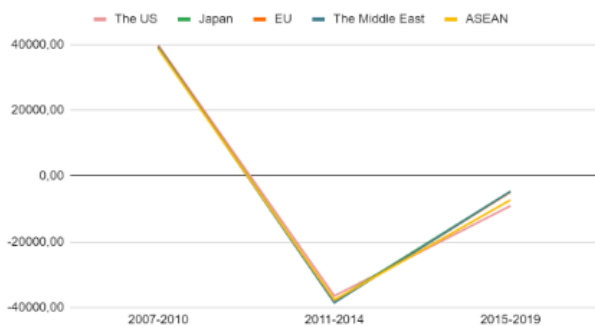


Figure 8: Competitiveness Effect of Vietnam tuna HS 0303 at five imported markets

c) 0304

For tuna code 0304, in 2012 Vietnam started exporting to 5 markets. Therefore, this study analyzes the factors affecting the competitiveness of Vietnam in the two periods 2012-2014 and 2015-2019.

RCA

In the US, Vietnam had a competitive advantage when the RCA value was highest among exported countries. Only Vietnam and Ecuador had a competitive advantage with this industry code. In terms of value export, most countries tended to increase. Although Vietnam was the country with the largest increase, Vietnam’s RCA fluctuated. This shows that tuna 0304 from Vietnam in the US market lost interest.

Table 19: RCA of Vietnam tuna HS 0304 in US market

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	-	-	-	-	-	5,13	10,31	12,18	8,87	7,65	7,37	7,36	6,67
Indonesia	-	-	-	-	-	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Ecuador	-	-	-	-	-	-	2,59	5,09	7,50	9,67	7,90	5,68	6,37
Thailand	-	-	-	-	-	0,00	0,76	1,09	1,18	1,13	0,66	0,63	0,51

In the EU, for tuna code 0304, Vietnam’s RCA index was the highest with the average value 28,45. This reflects that Vietnam had a strong competitiveness in this market. Although the market share of Vietnam’s tuna 0304 in the EU gradually increased, the RCA value tended to decrease slightly. Thus, it is clear that Vietnam’s competitive advantage in this tuna code was not really stable.

*Table 20: RCA of Vietnam tuna HS 0304 in EU market*

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	-	-	-	-	-	25,45	40,46	42,92	31,30	23,57	20,97	21,09	21,87
Ecuador	-	-	-	-	-	0,00	10,15	17,94	26,49	29,77	22,45	16,28	20,87
Thailand	-	-	-	-	-	5,90	2,99	3,84	4,18	3,47	1,87	1,81	1,69
Indonesia	-	-	-	-	-	10,61	12,34	19,91	16,05	13,46	10,83	21,02	22,83

In the Japanese market, Vietnam still retained its competitive advantage, with an average RCA of 1,16. Meanwhile, Thailand and Taipei did not have a competitive advantage in this market, the average RCA index of these countries was very low (<1). Besides, with the increase in value, the RCA rose simultaneously. This means that Vietnam focused more on exporting this product.

*Table 21: RCA of Vietnam tuna HS 0304 in Japan market*

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	-	-	-	-	-	0,82	1,29	1,73	1,18	1,11	1,02	1,06	1,10
Thailand	-	-	-	-	-	0,19	0,10	0,15	0,16	0,16	0,09	0,09	0,08
Taipei, China	-	-	-	-	-	0,00	0,00	0,01	0,03	0,04	0,05	0,06	0,05

In the Middle East and ASEAN, Vietnam’s tuna 0304 tended to fluctuate strongly during 2012-2019 and achieved very high RCA values. Competitor countries also had RCA values >1, but export values fluctuated, even decreased, which means the competitive advantage of Vietnam in these markets was quite high and relatively stable.

*Table 22: RCA of Vietnam tuna HS 0304 in The Middle East market*

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	-	-	-	-	-	42,76	59,73	84,16	81,89	76,84	56,88	56,35	56,63
Thailand	-	-	-	-	-	9,92	4,41	7,54	10,94	11,32	-	4,85	4,37

*Table 23: RCA of Vietnam tuna HS 0304 in Asean market*

Asean	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	-	-	-	-	-	42,24	74,82	54,70	29,24	35,60	66,59	57,90	54,01
Taipei, China	-	-	-	-	-	0,00	0,01	0,47	0,68	1,18	3,44	3,29	2,49
Japan	-	-	-	-	-	1,66	1,32	0,73	0,49	0,56	1,27	1,03	1,28

In conclusion, with tuna 0304 in all 5 markets during 2012-2019, Vietnam always had the highest RCA index compared to rival countries on tuna code 0304. With the increase in RCA value, this product became a priority in Vietnam’s exporting chain.

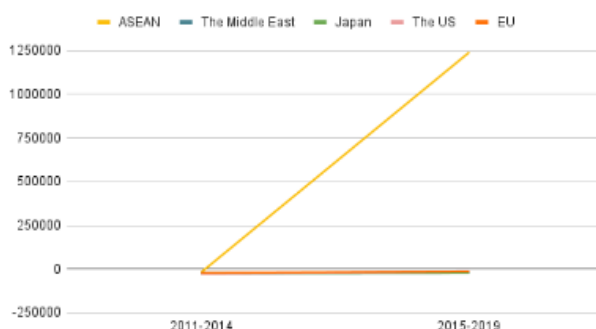


When considering tuna 0304, we can see that the Standard World Growth Effect tends to increase strongly. This shows that the total demand in the markets decreased significantly and reduced negative pressure on exporters. Coming to Commodity Composition Effect, from stage II-III, this value dropped. This reflects that consumer interest in this code had reduced.

*Table 24: Standard World Growth Effect and Commodity Composition Effect of tuna HS 0304*

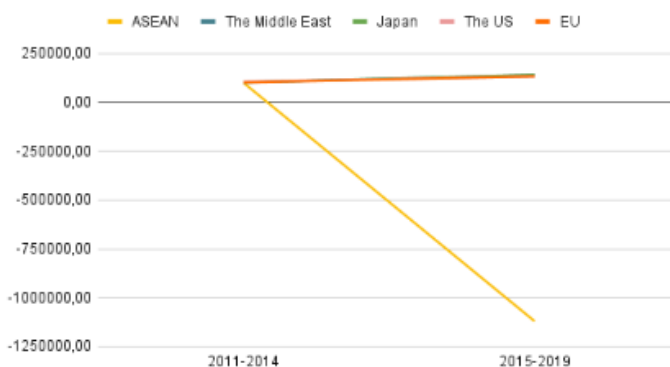
Period	Standard World Growth Effect	Commodity Composition Effect
2012-2014	966,20	21766,89
2015-2019	6729,49	14993,96

For the Market Distribution factor, except for the ASEAN market, there was a positive growth in resource allocation when exporting tuna 0304, reaching a positive value during 2015-2019 and recording a slight increase in the value of period III compared to period II, but in both periods still had negative values. Generally, Vietnam had not allocated value properly when exporting tuna 0304 to all 5 markets, but Vietnam made efforts to change it more positively.



*Figure 9: Market Distribution Effect of Vietnam tuna HS 0304 in five imported markets*

Next is the competitiveness impact on tuna 0304. While the ASEAN market decreased in 2 periods, the value increased slightly in other markets. This reflects the quality of this code of Vietnam when exporting to the ASEAN market tends to decrease, while when exporting to the other 4 markets, it increases slightly.



*Figure 10: Competitiveness Effect of Vietnam tuna HS 0304 at five imported markets*

**d) 1604**

**RCA**

In the US market, the RCA index of Vietnam was >1 with an average value of 3,34. Whilst, the RCA values of Ecuador and Thailand were 84,48 and 22,82 respectively. This means that Vietnam had a

competitive advantage but encountered strong competitors. In general, the export value of Vietnam's tuna 1604 tended to increase. However, the RCA value showed a downward trend, which means that despite being exported more, this product had not yet become a paramount product in Vietnam's export chain.

*Table 25: RCA of Vietnam tuna HS 1604 in US market*

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	5,03	4,11	3,09	3,36	3,35	3,54	3,69	3,34	3,19	3,29	2,89	2,42	2,17
Indonesia	3,82	3,14	3,28	2,45	2,99	3,50	4,06	3,89	5,00	5,17	5,24	5,08	5,56
Ecuador	68,63	69,85	48,43	38,27	55,01	66,14	81,83	85,73	98,29	118,25	136,25	123,22	108,29
Thailand	25,97	27,24	22,16	19,95	21,89	22,03	22,91	22,92	23,80	24,81	21,43	21,40	20,15

In the EU market, with tuna 1604, Vietnam still had a competitive advantage when the RCA was always >1. Whilst Ecuador, the strongest competitor, had an average value of 66,54. Besides, showing an upward trend in export value, only the RCA of Ecuador showed growth and Vietnam did not. This means although the export value rose, this product in the EU market lost focus.

*Table 26: RCA of Vietnam tuna HS 1604 in EU market*

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	4,15	3,54	2,75	3,60	3,24	3,48	2,95	2,62	2,23	2,32	1,96	1,70	1,65
Ecuador	56,62	60,06	43,17	41,05	53,29	65,04	65,40	67,40	68,61	83,22	92,71	86,30	82,14
Thailand	21,43	23,42	19,75	21,40	21,21	21,66	18,31	18,02	16,61	17,46	14,58	14,99	15,28
Indonesia	3,15	2,70	2,92	2,62	2,90	3,44	3,24	3,06	3,49	3,64	3,56	3,56	4,22

In the Japanese and The Middle East, for tuna 1604, Vietnam still retained competitive advantage, with an average RCA >1. Meanwhile, the competitor-Thailand, had a higher competitive advantage. The export value from Vietnam and Thailand had fluctuated, while the RCA of both countries had decreased. This shows that this product was gradually no longer receiving priority.

*Table 27: RCA of Vietnam tuna HS 1604 in Japan market*

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	5,40	4,40	3,55	4,94	4,31	4,52	4,58	4,16	3,00	2,49	2,27	2,03	1,88
Thailand	27,92	29,10	25,47	29,33	28,14	28,17	28,43	28,57	22,40	18,77	16,88	17,93	17,48
Taipei, China	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00

*Table 28: CMS of Vietnam tuna HS 1604 in The Middle East market*

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	4,42	3,43	2,38	2,69	2,59	2,70	3,15	2,74	2,23	1,74	2,00	1,34	1,24
Thailand	22,84	22,68	17,08	16,00	16,93	16,84	19,58	18,83	16,66	13,07	14,89	11,87	11,52

In the ASEAN market, Vietnam had the highest RCA for tuna 1604 when owned at an average value of 26,09. In terms of value, despite experiencing fluctuations, there had been periods of rapid increase. However, RCA value showed a downward trend. Therefore, despite having strength, Vietnam's competitiveness was unstable.

*Table 29: CMS of Vietnam tuna HS 1604 in Asean market*

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Vietnam	39,27	19,78	21,00	25,49	14,38	12,76	15,01	14,15	9,80	8,20	11,32	8,21	6,60
Taipei, China	0,03	0,01	0,02	0,03	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01	0,01
Japan	0,23	0,13	0,22	0,19	0,11	0,07	0,11	0,09	0,08	0,09	0,10	0,10	0,09

In all markets with tuna under HS 1604, Vietnam's export value seemed to increase. However, except for ASEAN, the RCA value seemed to decrease over the years. This can be concluded that, in these four countries, Vietnam was no longer focusing on this product. And for ASEAN, although exporting this product was highly prioritized in some periods, Vietnam couldn't maintain its strength.

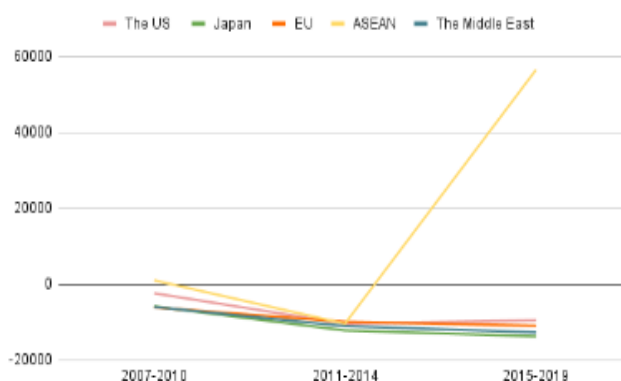
### *CMS*

The Standard World Growth Effect of tuna with HS 1604 fluctuates erratically. In stages I-II, this value decreased, reflecting that pressure on exports increased. Whilst, during periods II-III, this value increased, showing that the opportunities for exporters rose. Similarly, with the Commodity Composition Effect, this value increased in I-II, illustrating that commodities from Vietnam were preferable. Conversely, when this value decreases in II-III, consumer interest in this product declines.

*Table 30: Standard World Growth Effect and Commodity Composition Effect of tuna HS 1604*

Period	Standard World Growth Effect	Commodity Composition Effect
2007-2010	4308,79	2204,82
2011-2014	1954,37	10192,44
2015-2019	7278,20	6869,49

Regarding Market Distribution, except for the ASEAN market, this value was negative in all markets in 3 periods. This shows that Vietnam had not yet allocated resources properly. While in ASEAN, in stages I and III, the Market Distribution value was positive. This reflects that Vietnam had more rational allocation of value to this market. However, this value had a negative value in phase II, which means Vietnam still has many limitations in this distribution.

*Figure 11: Market Distribution Effect of Vietnam tuna HS 1604 in five imported markets*

With the Competitiveness Effect factor of Vietnam's HS 1604 tuna, the trend in all 5 markets was up in phase I-II and down in phase II-III. Except for the ASEAN market, the value of Competition Effect in all countries was positive. Meaning that as well as value, the quality of this product improved

significantly. However, in the ASEAN market, the value in phase III showed that the quality at this stage significantly reduced.

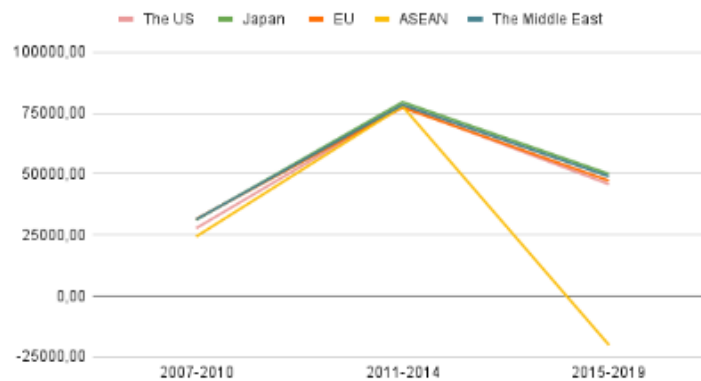


Figure 12: Competitiveness Effect of Vietnam tuna HS 1604 at five imported markets

#### 4.2. Discussion

Our research results have some similarities with previous studies on the competitiveness of Vietnam’s tuna export industry, such as Uyen Vo Thi Le (2022). However, our study has provided a more comprehensive perspective than previous research. First, this study was conducted on a broader basis. We looked at the top 4 tuna exports from Vietnam. Meanwhile, Uyen Vo Thi Le (2022) inclined to consider one yellowfin tuna code. Overview of the tuna industry as a whole, there are few research papers on the competitiveness of the tuna export industry. Therefore, to a great extent, this analysis helps to provide an overview to maintain and improve the position of Vietnam’s tuna exports. Second, our study has used the CMS model to analyze the factors affecting the competitiveness of Vietnam’s tuna export industry. From there, it is possible to identify the strengths and weaknesses of Vietnam when exporting each of these tuna codes to foreign markets.

From the results, we can see that Vietnam had a competitive advantage in the US, EU and Middle East markets. The results of the CMS index also show the interest and preference of consumers for Vietnamese tuna. Otherwise, in the EU, US and Middle East markets, although they had competitive advantages, they still gradually declined. This shows that Vietnam only exported at a sustained level, but did not focus much on this industry. Besides, the transportation and storage cost issue in Japan was also a problem that Vietnam should take into consideration. This is a wake-up call for Vietnam to improve its policies to maintain its position on the world tuna map.

In 2012, when the code for tuna filets (0304) was first exported to the world market, the competitive advantage of tuna filet increased in all 5 markets, but it was accompanied by a gradual decline of fresh tuna (0302). In terms of export value, we can see Vietnam’s focus on tuna filets and a gradual decline in fresh tuna. The quality of the tuna filet group meets the standards of the markets, while the fresh tuna group does not. Due to the actual conditions in the process of handling these two types of fish, Vietnam is also limited by the handling and preservation of fresh fish. However, the competitiveness indicators and export value still show signs of decline of tuna filets on the world market.

For the prepared, preserved tuna product (1604), its competitive advantage in the US, Japan, EU and Middle East markets was average and tended to decrease. This was due to the fluctuating global demand for this industry and the improper allocation of export value in these markets. Only in the ASEAN market did Vietnam have a relatively high competitive advantage. Part of the reason is that Vietnam had made efforts to more rationally distribute canned tuna products. It showed that Vietnam focused more on exporting 1604 to

the ASEAN market compared to other markets. With that, this tuna product continued to receive significant attention from consumers worldwide.

On the contrary, frozen tuna (0303) had experienced significant fluctuations across different periods. Despite the positive shifts in consumer interest worldwide for this product, production volume and quality had not been ensured. Furthermore, only in the ASEAN market, Vietnam made efforts to improve the distribution of frozen tuna products, while the distribution was uneven.

In general, Vietnam has a competitive advantage in the tuna export industry to some major markets under consideration. However, similar to the research results of Hasanul Haque (2013), despite having a competitive advantage, in order to maintain and enhance its market position in this industry, Vietnam should take actions immediately. Specifically:

*For fishermen:* It is necessary to widen their understanding of advanced technologies in catching and preserving tuna. In addition, ship owners need to be more disciplined in keeping fishing logbooks to both avoid duplicate fishing in the same fishing ground and improve the product's reputation when exporting to countries with strict fishing requirements.

*For government agencies:* Firstly, Vietnam is one of the countries with the IUU yellow card. This negatively affects the competitiveness in export markets, especially the EU market. Therefore, the implementation of strong measures and policies improve the knowledge and skills of standard fishing for fishermen. Regarding the standard of fish caught for an average adult tuna, it should range from 40-50 kg. Fish that do not meet the standards of kilograms will be released back into the sea. Second, according to VASEP, because many fishing ports now stop issuing S/C certificates for tuna products caught for more than a month. Therefore, the government should invest technological equipment as well as patrol teams to support fishermen in case of emergency to ensure supply. Finally, the Vietnamese government needs to implement measures to optimize allocation of export value among markets like the US, EU and Middle East.

## 5. CONCLUSION

Vietnam's tuna industry has currently played an important role in the export value chain. It proves that the research conducted to vividly define Vietnam's position in the international arena is vital. Thanks to the results, the strengths and weaknesses of the tuna industry can be illustrated, thereby finding resolutions to foster the competitiveness of the whole industry. After analyzing RCA in the period 2007-2019, in the Japanese market, Vietnam did not have a competitive advantage. Meanwhile, in the other 4 markets, Vietnam held certain competitive advantages over time. However, these values showed a downward trend in all markets. In addition, when focusing specifically on the codes 0302, 0303, 0304, 1604, we clearly see the downtrend of the four codes. Especially, only tuna with 0304 was the product that became more precious. Then, based on CMS analysis for each detailed code and the whole tuna industry in 3 periods, it shows that Vietnam had improved the quality of exported tuna (especially 0304) to meet the needs of markets and Vietnam tuna was more popular with consumers around the world, especially in codes 0304 and 1604. However, Vietnam had not properly allocated both the tuna industry as well as specific groups of tuna. Finally, the study has recommended various measures such as changing from exploitation, processing, preservation and boosting product quality to distribution for each tuna industry code in particular and the whole tuna industry as well.

Despite efforts to better the study, some limitations still exist. The first is a methodological limitation. Since only two main models, RCA and CSM, are used, the study has not provided an in-depth analysis of the underlying reasons for the decline in Vietnam's competitive strength. Second, the study has not

considered other sectors that use the same resources as tuna. The priority of the research is on the group of event fish industries exported by Vietnam. Consequently, resources were transferred from the fishing industry to which sectors were not vividly analyzed. In order to gain a deeper insight into the assessment of Vietnam's seafood export industry, future studies may take advantage of the following suggestions. It may be the use of different supportive models to analyze the factors affecting the RCA, CMS models. For example, the FsQCA model analyzes the structures to determine results. Besides, it is possible to expand the research topic in this direction with other types of disciplines.

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## EXPLORING FACTORS INFLUENCING JOB SATISFACTION OF EMPLOYEES DURING THE DIGITAL ERA: THE PRACTICAL CASE IN HO CHI MINH CITY

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*ABSTRACT: The digital workplace is a growing trend changing how businesses operate and how employees carry out their duties. But not everyone is happy or comfortable with this change. The study will examine the key elements influencing the job satisfaction of whom are working in Ho Chi Minh City, reach conclusions, and offer suggestions for enterprises and organizations. For managers, human resource directors, consultants, and policy scholars interested in this area, this study will be instructive. This study uses the Theory of Reasoned Action, Work Characteristics Model, Technology Acceptance Model, and Technology-to-task Fit Model to integrate into the overall model. Then test these models with Exploratory Factor Analysis, Cronbach Alpha, and Structural Equation Modeling and give the results by Bootstrapping method. From the research results, the authors advise organizations to enact suitable policies to enhance their employees' satisfaction and stimulate their well-being.*

*Keywords: Digitalization, TRA, TAM, WCM, TTF, SDT, satisfaction.*

### 1. INTRODUCTION

Ho Chi Minh City (HCMC) is a major economic hub in Vietnam, attracting numerous multinational corporations and diverse industries. The urban area has experienced rapid development in information technology and the digital industry. This can be seen through the presence of leading technology companies. HCMC is home to many top technology companies in software development, information technology, and the digital industry. Technology conglomerates like FPT, VNG, CMC, and numerous IT startups are actively operating thriving here. HCMC has created a favourable environment for the development of technology incubators and startups. Technology clusters and innovation centres such as District 2 (Thu Thiem District), District 9 (Phu My Hung New Urban Area), and the Dreamplex Technology Innovation Center are attracting creative individuals and companies in the field of information technology. HCMC is actively promoting the use of emerging technologies such as artificial intelligence (AI), blockchain, the Internet of Things (IoT), and deep learning. The application of these technologies in sectors such as transportation, healthcare, education, and business is driving the development of information technology and the digital industry in the city. Many multinational companies are investing in and expanding their business operations here. Multinational corporations such as Samsung, Intel, Unilever, Nestlé, and many others have offices and factories in HCMC. The presence of multinational businesses creates a multicultural working environment with diverse languages, cultures, and international regulations. HCMC has a concentration of diverse industries, including manufacturing, services, finance, real estate, education, healthcare, and many other fields.

The application of technology and the related developments in the digital age have brought about significant changes and impacts on the work environment. Conducting research on job satisfaction in this context can help us better understand the influence of information technology on employees and their

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work. As business operations expand, manual processes are unable to meet the efficiency requirements of enterprises due to increased business complexities, changing and improving service products, growing workforce, and increasingly complex sales scenarios, leading to management difficulties. Many businesses face drawbacks in their management processes due to “patchwork” procedures, overlapping information, lack of synchronization, and lack of flexibility among departments. Therefore, the application of technology in daily operations is necessary for businesses to optimize operations and enhance competitiveness.

HCMC is the political and administrative centre of Vietnam, where developments related to work regulations and policies take place. Changes in the field of labour code, and regulations regarding wages, rights, and working conditions have occurred. For example, companies that do not pay equal wages or discriminate based on gender for workers performing equally valuable jobs will be fined from 5 to 10 million VND, as previously stipulated. There were no penalties specified for such behaviour before. The maximum working hours per shift are regulated as follows: For daily labour, the working hours should not exceed 8 hours per day and 48 hours per week. For weekly labour, the working hours should not exceed 10 hours per day and 48 hours per week. The government of HCMC has introduced various policies and regulations to promote the development of information technology and the digital industry. These policies include encouraging investment in information technology, providing favourable conditions for technology companies and startups, offering financial support, and facilitating the training of high-quality human resources. These changes can impact the job satisfaction of workers. Additionally, HCMC is a diverse cultural hub, attracting people from various regions within the country and from abroad. This multicultural environment creates a vibrant workplace with the intersection of different cultures and values.

In the era of economic integration and rapid digital development, competition has become increasingly fierce, and human resources play a crucial role in gaining a competitive advantage. Particularly for businesses in the midst of growth, rapid economic expansion, and a vibrant business environment with millions of people living and working there, it creates a competitive labour environment and work pressure. Seeking and asserting one’s position in the market requires careful attention to employee satisfaction. Therefore, this research is conducted to “Exploring factors influencing job satisfaction of employees during the digital era: the practical case in HCMC” human resource policies to satisfy the employees, thereby enhancing the individual performance of each employee and improving the overall business effectiveness of organizations in the digital age.

Previously, there have been studies on the impacts on the satisfaction of workers based on JDI such as the research of Tran Kim Dung (2005) in the *Journal of Science and Technology Development Magazine*, this study has launched an analysis to measure the level of satisfaction of work in Vietnam’s conditions. By applying Smith’s JDI scale, Kendall & Hulin (1969), the results showed that there were 7 variables affecting the satisfaction of the job, including: (1) The nature of the job, (2) income, (3) opportunities for promotion, (4) leaders, (5) colleagues, (6) welfare, (7) working conditions. Research by Ha Nam Khanh Giao and Vo Thi Mai Phuong (2011) produced similar results.

With the topic of measuring the level of satisfaction of employees of joint stock commercial banks in Dong Nai province - thesis from MS. Nguyen Hoang Diem Huong (2013) has shown a comparison of its results with research by author Do Ngoc Nhu Phuong (2011) and Le Hoang Trang (2012) at the research location in Ho Chi Minh City. Concluded the level of satisfaction of the study in Dong Nai for higher results than two studies in Ho Chi Minh City, the reason is that the author pointed out that in the provinces, the level of competition is not as fierce as banks in key cities like Ho Chi Minh City, the living standard in the province is lower and the number of employees has banking qualifications are also less because the human resources are mostly concentrated in big cities.



Reaching out to the world, research by Joerg Beechl, Ralf-Christian Härtinga, Mara Schrödera (2021) on the effects of digitalization on employees' satisfaction in small and medium enterprises that used the theory of data platforms, showing the relationship between staff satisfaction and digitization in small and medium enterprises. Resulting in digital technology, affecting employee satisfaction. Although qualitative research has some limitations: only 12 experts from small and medium-sized businesses are interviewed and the results are only meaningful to a limited level and in the context of interviews sometimes experts have been supported with the question.

Research by Nidhi S. Bisht, Clive Trusson, Juliana Siwale, M. N. N. Ravishankar (2021) named "Enhanced Job Satisfaction Under Tighter Technological Control: The Paradoxical Outcomes of Digitalization" concluded the satisfaction in the work of the penetrating insures. The research survey from the employees of the small-scale Indian corporation tends to increase, the same trend was the phenomenon of complaining of unnecessary issues of technology. Several other premise studies had discussed the benefits related to autonomy and flexibility to easily choose the time to work for employees but such benefits had not been proven in this study. But moreover, it brings very different results, the main reason is due to the reaction of each individual when experiencing a bad digital product and fear about the issue of identity defence and due to concern that the staff managers. Technology software can authorize the identity of employees to do other things. However, Nidhi S. Bisht and his colleagues (2021) still showed a positive reaction to the application of digital.

However, in Vietnam, especially with the current development of technology, it is almost impossible to find specific domestic research on the digital factor affecting the satisfaction of workers at work. Based on the latest development situation of our country these days and discovering the limitations of the above research articles, our research would fill those research gaps.

Since the workforce is the significant factor affecting performance and the development of the firm, measuring employee satisfaction is the core objective of human resource management. Therefore, it is necessary to verify that their personnel are content with their current jobs. It is the puzzle that must be solved at the outset to improve the efficiency and effectiveness of an employee's performance. Besides, the digital industry is increasingly inherent in the workplace, with the appearance of cutting-edge digital elements and fully automated processes. Through the considerations listed above, we see the need to unveil the aspects affecting job satisfaction in the digital workplace.

According to Hoppock, R. (1935) job satisfaction is an employee's job happiness, as a result of a mix of psychological, physiological, and other elements. Employee job satisfaction is influenced by other environmental elements. Aziri also describes job satisfaction as the emotional experiences when workers believe their jobs enable them to achieve their physical and psychological demands. Job satisfaction with digital tools reflects the overall affective perception of the experience of using such tools. For a business to grow sustainably, employee's satisfaction is a crucial factor. Still, quantifying job satisfaction is a challenging task because of the dynamic variations in the job satisfaction scale from one person to the next. This shift is primarily because employee behaviour is somewhat influenced by several variables such as technological traits, career advancement, employment structure, management style, and proactivity at work.

Digitalization is the process of converting information from analogue to digital form. It includes the use of measuring devices, decoders, computers, and software to convert data from physical form (such as paper, images, audio or video) into digital form. According to Legner et al. (2017), the term "digitalization" has been developed to refer to the numerous sociotechnical phenomena and occurrences that arise with the adoption and use of these technologies in larger settings within the individual, organizational, and societal levels.

In the context of the digitization workplace, Krauss, M. (2020), Cijan et al. (2019), Bolli and Pusterla (2022) are the authors applying the Work Demand-Resources Model (WD-R), Self-Determination Theory (SDT), Technology Acceptance Model (TAM), and Work Characteristic Model (WCM) to shed light on the intricate interrelationships between digital technology, job requirements and resources, employee behaviour and attitudes at work, and psychological needs of employees regarding autonomy, competence, and suitability for successful adoption and ongoing use of digital tools in the workplace. There are different and similar points of view between the articles, which is also the basis for us to refer to and hypothesize for the research paper.

This study then tested these models by EFA, Cronbach Alpha, PLS SEM, after that, gave the results by Bootstrapping method. From the research results, we also proposed solutions to improve employee satisfaction in the digital environment. These solutions may involve polishing up the work environment, training and developing employees' skills, optimizing work processes, and effectively utilizing digital technology. The findings of this study provide valuable information about social factors, professional skills, technological characteristics, the association between tasks and technology, physical conditions, awareness of the usefulness of digital tools, and employee satisfaction. These factors help businesses and organizations to elevate the quality of the work environment and meet the needs of employees in the rapidly evolving digital context, consequently, play a significant role in maintaining and enhancing competitiveness in the labour market.

## **2. THEORETICAL FRAMEWORK**

### **2.1. The theory of Reasoned Action (TRA)**

*The theory of Reasoned Action (TRA)* was created by Ajzen and Fishbein in 1967, and since then, it has been modified and refined further. The theory of reasoned action has been used successfully to predict and explain why people have (or have not) engaged in a wide variety of behaviors including smoking (Chassin et al., 1981; Fishbein, 1980). The primary goal of TRA is to comprehend a person's voluntary conduct by studying the person's concealed desire to carry out an activity. According to theory, an action's intention comes before its execution. Since behavioural intentions are "defined by attitudes towards behaviour and subjective standards", TRA can be used to elucidate the reasoning behind continuing to use digital equipment.

### **2.2. The Technology Acceptance Model (TAM)**

*The Technology Acceptance Model (TAM)* demonstrates how perceived usefulness and usability affect employees' acceptance of and use of digital technology in the workplace. The psychosocial theories of planned behaviour (TPB) and rational action (TRA) are the origins of TAM. TAM has been the focus of numerous study projects examining people's intents, beliefs, and usage of technology. The behavioural intention of the research object is determined by this model's usage of factors indicating ease of use and usefulness, which determine whether to accept or reject its use. For example, recent evidence has found ATCU (Attitude towards computer use) to be a significant predictor of the intention to use technology, especially in settings where the use of technology is voluntary (eg, Chau, 2001; Venkatesh, Morris, Davis & Davis, 2003).

### **2.3. Technology-to-task fit model (TTF)**

*Technology-to-task fit model (TTF)* is built to understand the results of technology investment for employees or users. This model specifies that the information technologies used in organizations must be suitable for the job characteristics, hence, task requirements and technology functions must match. The day-to-day operations of an organization are typically performed by employees (Torkzadeh, G., Koufteros, X., & Doll, W. J. (2005)). For this reason, employees' perception of task and technology fit is of significant value to user productivity, feasibility, and effectiveness (Moore, G. C., & Benbasat, I. 1991).

## **2.4. Self-Determination Theory (SDT)**

*Self-Determination Theory (SDT)* is a psychological theory that focuses on the motivation behind human behaviour. The three suggested fundamental psychological requirements are Autonomy, Competence, and Significance. Fulfilling these three demands consequently can increase intrinsic motivation, which is the drive to do something because of the intrinsic pleasure and fulfilment it brings.

## **2.5. The Work characteristics model (WCM)**

*The Work characteristics model (WCM)* is used in this study because it illustrates the connection between job features and employees' individual experiences in that position. Worker productivity, job satisfaction, energy level, and health are all impacted by this influence. The model is built upon the study conducted by Kwiotkowska, A., & Gębczyńska, M. (2022). The research paper explores different combinations of job characteristics that contribute to job satisfaction within the framework of Industry 4.0. Specifically, it focuses on small and medium-sized businesses that have implemented Industry 4.0 solutions.

### **2.5.1. Task Characteristics (TC)**

*Task Characteristics (TC)* is a theory in the field of management and work psychology, developed by psychologists Richard Hackman and Greg Oldham in 1976. According to this theory, five main characteristics affecting employee satisfaction and performance: Job Autonomy; Skill Variety; Significance; Task Identity; and Feedback from Job.

### **2.5.2. Contextual Characteristics (CC)**

*Contextual Characteristics (CC)* were proposed by American psychologist - Richard Snow in 1989 to explain how the surrounding environment affects human behaviour. including three elements: Physical Demands, reflecting the level of physical activity or physical exertion required on the job; Work Conditions, reflecting the environment in which a job is performed; and Equipment Use, reflecting the variety and complexity of tools used in a job.

### **2.5.3. Social characteristics (SC)**

*Social characteristics (SC)* include four scales related to the opportunities that work offers for social interaction with others. These scales include Social Support, Interdependence, Interaction Outside The Organization, and Feedback From Others.

### **2.5.4. Knowledge Characteristics (KC)**

*Knowledge Characteristics (KC)* reflect the types of knowledge, skills and ability requirements placed on an individual being assessed on the job, including 5 elements: Complexity Of Work, Information Processing, Problem-Solving, Skill Variety, and Specialization.

Integrating these models can help study the interaction between the factors affecting the behaviour of using technology in the work environment. Particularly, work characteristics can affect the sense of autonomy and users' effort, which in turn influences their attitudes towards technology. Users may be more willing to embrace and employ technology if they believe it is simple to use and essential to their work. Moreover, these elements may also influence users' motivation, making it simpler for them to use the technology. Depending on the particular work environment, these elements may interact and affect user behaviour in a variety of ways.

Broadly speaking, the merging of TRA, WCM, SDT and TAM models is the provision of an in-depth approach to research technology usage behaviour in the workplace.

### **3. RESEARCH METHOD**

The study is mainly focused on workers who have been or are working in a digital workplace in the Ho Chi Minh City, including those aged from 18 to over 51 years old.

#### **3.1. Statistical Methods**

##### **3.1.1. Qualitative research methods**

In this research, the questionnaire was made to explore employee satisfaction in the digital context. The survey-based data could provide initial information and support for quantitative research, thereby clarifying and explaining the causes of the results. quantitative research.

##### **3.1.2. Quantitative research methods**

The purpose of quantitative research is to measure and test the relationship between variables in statistical form. Following data collection, descriptive statistics on age, gender, and experience with exposure to the digital environment will be used to analyze the data and make inferences about the overall assessment.

To examine the data, the study employs a variety of models. Successively, Cronbach's alpha is used to analyse and use the EFA exploratory factor to evaluate the data and finally determine the weights by the PLS-SEM model. After that, those results are combined with the background theories to evaluate workers' job satisfaction.

#### **3.2. Overall study sample and questionnaire**

The sample size for the research was determined based on the factor analysis method guidelines. For this study, the authors determined the sample size to be 447, which exceeds the minimum requirement of 71 observed variables multiplied by 5, as suggested by Bollen.

The data collection method employed in this study involved the administration of a questionnaire survey with a specific focus on HCMC. Given the sample size of 447, the research team devised a questionnaire and distributed it to potential participants from our network. The distribution was conducted through various channels, including email, social networking platforms, and messaging.

#### **3.3. Evaluate the reliability of the scale**

In the quantitative study, the research team used Cronbach's Alpha test method before analyzing the EFA exploratory factor to eliminate inappropriate observed variables in the same factor.

Cronbach's Alpha helps to check whether the observed variables of a factor (in which, there are at least 3 observed variables) are reliable or not. It shows which observed variables of the factor contribute to the conceptual measure of the factor.

#### **3.4. Exploratory Factor Analysis (EFA)**

The model consists of six steps according to Hoang Trong and Chu Mong Ngoc (2010): defining the problem, building the correlation matrix, calculating the number of factors, rotating the factors, naming and explaining factors, and finally factor calculations.

Before performing this analysis, we need to test the conditions for performing EFA. Usually, studies using KMO coefficients (Kaiser-Meyer-Olkin) and Bartlett can be accepted if KMO coefficients is in the range from 0.5 to 1, and the significance level of Bartlett test is less than 0.05.

#### **3.5. Structural Equation Modeling (SEM)**

The research team used PLS-SEM due to the complex nature of the model. After building the path model, evaluate the reliability of the scale by the normalized load factor (greater than 0.7, the observed variable is significant in the model) and the scale convergence value by AVE (greater than 0.7, the observed variable is significant in the model) mean extracted variance. Hair et al (2021) said that the value of AVE reaching from 0.5

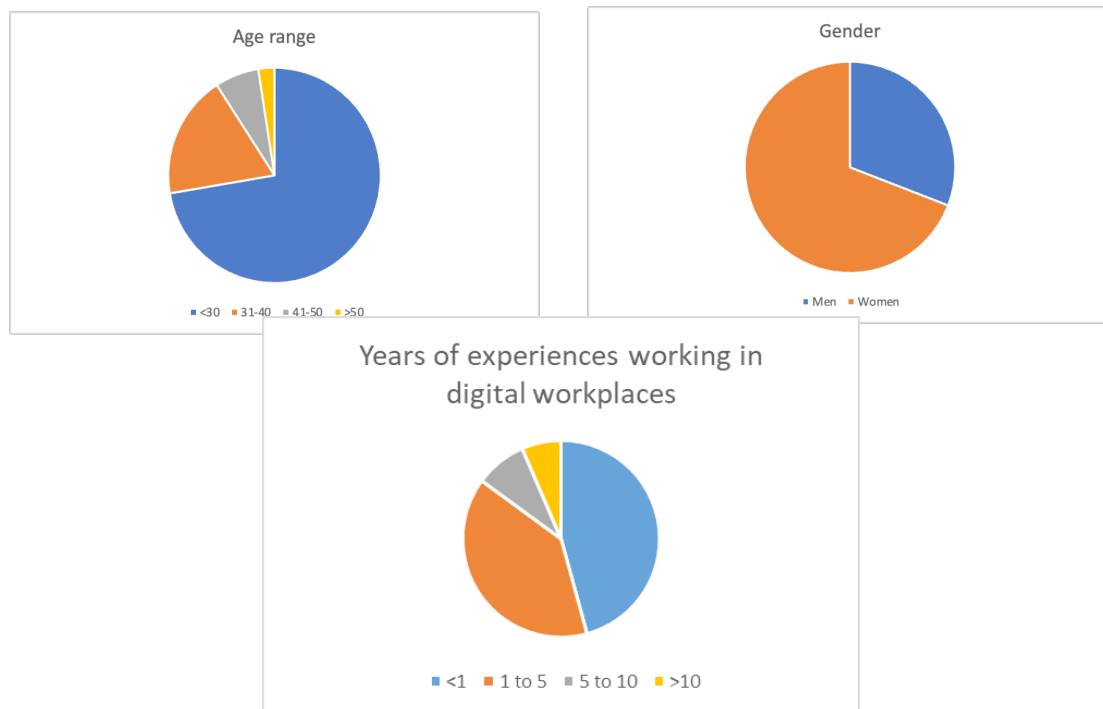
or more shows that the scale has good convergence. After testing the measurement model, conducting structural testing including evaluating multicollinearity between observations to ensure the coefficient of the path between observations and conducting bootstrapping to check the significance of the coefficient.

**4. RESULTS AND DISCUSSION**

**4.1. Results**

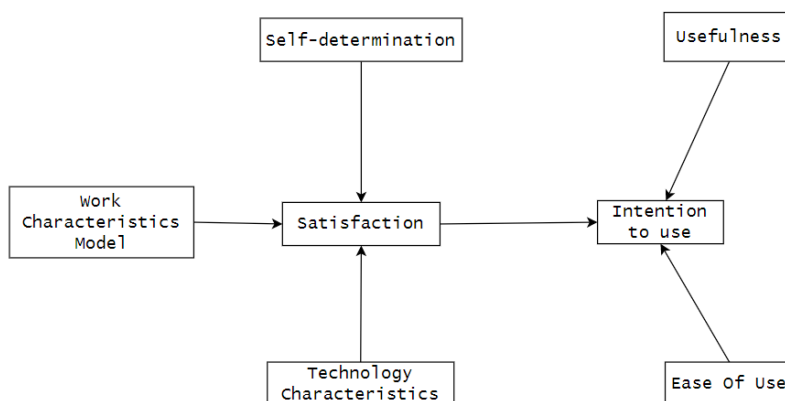
After 3 months, our research team received 479 responses, removed the non-quality samples, we kept 448 observations for research purposes. Using descriptive statistics for demographic variables, our research team presented the following pie chart and a brief model overview of the study below:

**Figure 1. Respondent Profile.**



Source: Research team

**Figure 2. Research Model**



Source: Research team

**4.1.1. Evaluate the reliability of the scale**

To analyze the reliability of the scales of the variables in the study, tests using Cronbach’s Alpha coefficients to remove unreliable observed variables before conducting factor analysis.

**Table 1. Cronbach’s Alpha coefficients.**

Variable	Cronbach’s-Alpha Coefficients	Variable	Cronbach’s-Alpha Coefficients
US	0.8336	SS	0.8184
SQ	0.8414	IN	0.8267
PTS	0.8787	FO	0.8618
JA	0.8384	CO	0.8183
SV	0.8090	IPS	0.8805
TS	0.8222	SP	0.9188
FJ	0.9567	SD	0.8860
PD	0.8132	UF	0.7703
WC	0.8998	BI	0.7725
EU	0.7836	SAT	0.8835

The results showed that the Cronbach alpha indexes are suitable and consistent to the next calculation steps.

**4.1.2. EFA Analysis Results**

The research team produced the results of running a number of criteria of the EFA analysis and the results from the Stata software including the Principal Components Analysis (PCA) test, eigenvalue, varimax rotation (added in the appendix), and the test. KMO determination and results of observed variables classified into 17 factors after data adjustment.

The eigenvalue test shows that there are 17 factors created (due to the threshold Eigenvalues > 1).

The results of the matrix rotation show that the independent variable is classified into 17 factors, all the observed variables have loading coefficients greater than 0.6 and there are no unusable bad variables.

After adjusting, removing outliers and deleting variables that do not fit the model, the remaining observation data is 447 suitable observations. After that, the research team performed Cronbach’s Alpha test and KMO test again, the authors have the result from Stata software equal to 0.532 (greater than 0.5) and conclude that Factor Analysis is consistent with the research data set.

Thus, the EFA exploratory factor analysis for the independent variables was performed within two-times. In the first time, 65 observed variables were included in the analysis, 32 observations in the data set that did not meet the conditions were removed for re-analysis. In the second (last) analysis, 65 observed variables converged and differentiated into 17 factors.

**Table 2. Goodness of fit test.**

	R-square adjusted		R-square adjusted
BI	0.539	TC	0.525
CC	0.688	TTF	0.678
KC	0.679	UF	0.767
SAT	0.690	US	0.614
SC	0.757		

This table 3 shows that R-squared adjusted of BI is 0.54, so the independent variables explain 54% of the variation (variance) of the BI variable, the remaining 46% is from systematic error and from other

factors outside the model. image.

The R-squared adjusted of SAT is 0.691, so the independent variables explained 69.1% of the variation (variance) of the SAT variable, the remaining 30.9% was from systematic error and from other factors outside the model.

In addition, the R-squared adjusted of CC, KC, SC, UF, TTF and US all reach approximately 0.7 and TC is greater than 0.5, so the independent variables included in the model can all explain these variables.

4.1.3. Path Coefficients

Table 3. Path Coefficients.

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ( O/STDEV )	P values
CC -> SAT	-0.043	0.000	0.065	0.000	0.000
KC -> SAT	0.151	0.182	0.055	3.330	0.001
SAT -> BI	0.210	0.213	0.052	4.025	0.000
SC -> SAT	0.167	0.090	0.095	0.962	0.000
SD -> SAT	0.081	0.105	0.064	1.574	0.000
TC -> SAT	0.114	0.108	0.046	2.394	0.000
TC -> TTF	0.373	0.381	0.051	7.301	0.000
TTF -> SAT	0.106	0.091	0.078	1.220	0.025
UF -> BI	0.426	0.430	0.056	7.626	0.000
US -> BI	0.106	0.124	0.070	1.522	0.128
US -> TTF	0.482	0.475	0.047	10.280	0.000

Considering p-value, we see the impact from Contextual Characteristics (CC) on satisfaction (SAT) < 0.05. Similarly, there are impacts from social characteristics (SC) to satisfaction (SAT), self-determination (SD) to satisfaction (SAT), and knowledge characteristics (KC) to satisfaction (SAT). SAT), task and technology fit model (TTF) to satisfaction (SAT) all have similar results < 0.05. This shows that these effects are statistically significant.

The experimental results are shown in the following figure 2:

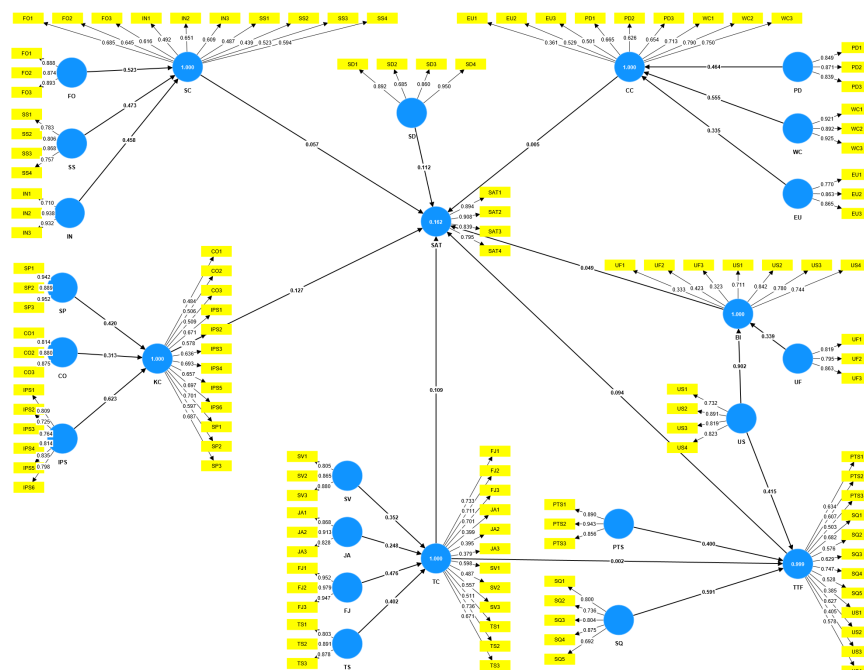


Figure 3. Research Model

Considering  $p\_value$ , we see that most of the path coefficients have  $p\_value = 0.000$ , which proves that the variables included in the model have an impact on the dependent variable, except that the impact of US on BI is not statistically significant (rejected due to  $p\_value = 0.128 > 5\%$ ).

#### **4.2. Discussion**

From the results of the above study, our team analyzed and made comments on the factors affecting the success of the digital environment in improving work performance and employee satisfaction at the workplace.

Among those factors, SC is considered by the research team to be the factor affecting employee satisfaction at work.

KC was also identified as one of the factors that strongly influenced the satisfaction of employees.

In addition, other factors such as technological characteristics, TTF also affect the success of the digital environment.

CC have a negative effect on job satisfaction, which is in stark contrast to the original hypothesis as well as the expected results that the research team wants.

Given the last point, while Kwiotkowska (2021) focused on how high or low satisfaction of the employees is based on WCM, this research can measure the negative and positive impacts on satisfaction, coupled with evaluating the continue-to-use behaviour.

Besides, the perceived usefulness of digital tools, along with employee satisfaction, will affect the intention to continue using digital tools at work.

The TAM theory applied to the model has not yet produced clear results, the research team concluded that determining the role of employees' perception of ease of use in the types of digitalization in work has not yet affected the intention to continue using digital forms to improve the quality of work output.

#### **5. CONCLUSION**

Our team had researched and given some useful recommendations to help managers and business managers in general based on our study results to increase employee satisfaction and motivation and build a positive digital workplace: Improve safety in the work environment; Focus on employee development; Improve service quality; Create a dynamic and attractive working environment.

From the results of the above study, our team analyzed and made comments on the factors affecting the success of the digital environment in improving work performance and employee satisfaction at the workplace. Among those factors, SC is considered by the research team to be the factor affecting employee satisfaction at work. KC is also identified as one of the factors that strongly influenced the satisfaction of employees.

In addition, other factors such as technological characteristics, TTF also affect the success of the digital environment. CC have a negative effect on job satisfaction, which is in stark contrast to the original hypothesis as well as the expected results that the research team wants. Besides, the perceived usefulness of digital tools, along with employee satisfaction, will affect the intention to continue using digital tools at work. The TAM theory applied to the model has not yet produced clear results, the research team concluded that determining the role of employees' perception of ease of use in the types of digitalization in work has not yet affected the intention to continue using digital forms to improve the quality of work output.

Due to the complexity and wide scope of research, the research team cannot avoid limitations and difficulties in the research process. The model cannot be generalized to the population: This may make the study results not generalizable to the entire population or region. The study may be limited in time



so sufficient data cannot be collected to answer the research question. Survey time-consuming: The questionnaire can cause difficulties and consume more time compared to other survey sets, so the data results may inevitably be wrong when the surveyor takes the survey and must read and think to answer the survey question.

False hypotheses: Research may be affected by incorrect assumptions or unreasonable theories that reduce the reliability of the research results.

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## **FACTORS AFFECTING THE COMMITMENT OF WORKERS TO GRASSROOTS TRADE UNION IN VIETNAM IN THE CONTEXT OF IMPLEMENTING NEW – GENERATION FREE TRADE AGREEMENT: A CASE STUDY OF GARMENT ENTERPRISES**

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*ABSTRACT: Choosing to study the commitment of workers to grassroots trade union in Vietnam in the context of implementing new-generation Free Trade Agreements: A case study of garment enterprises is necessary to clarify factors affecting the workers' commitment to the grassroots trade union. The study was conducted to evaluate the effect of five factors on the commitment of workers to grassroots trade union at Vietnamese garment enterprises: Protecting the benefits of workers; Communicating about the organization; Representing workers; Participating in management; and Developing welfare. The model is tested with a survey dataset of 221 union officials and workers from Vietnamese garment enterprises. From the research results, recommendations are made to promote the commitment of workers to grassroots trade union in the new context.*

*Keywords: Commitment; Workers; Grassroots Trade Union; Garment enterprise*

### **1. INTRODUCTION**

Trade unions have appeared in Western society since the early 18th century, with the role of a representative organization to protect the legitimate rights and benefits of workers around the world. In Trade Unionism (Sidney and Beatrice Webb's History, 1984), a union is referred to as "an association of wage earners whose purpose is to maintain or improve conditions hire them". At present, at enterprises, trade union organizations struggle and negotiate with employers to protect the rights and benefits of workers, share rights and responsibilities, and settle labor disputes, ... thereby contributing to promoting cooperation and correcting the behavior of stakeholders, thereby promoting healthy industrial relations. Thus, trade union organizations play an increasingly important role in building and developing harmonious and stable labor relations at all levels, especially at the grassroots level (Diep Thanh Nguyen, 2005). In Vietnam, trade unions play an important role in almost all political, economic, cultural, and social fields. Trade union organizations perform many functions and tasks, including the task of representing workers. From there, they help ensure the rights and balance the legitimate benefits between employees and workers, contributing to the harmony of labor relations and stability in production and business activities.

The garment industry is one of the key export industries of Vietnam, playing an important role in the economic growth of the country. Up to now, the textile and garment industry has accounted for 12 - 16% of the total export turnover of the country, specifically according to the announcement of the WTO (2021) export value reached 142 billion USD. In recent years, globalization and international integration have deepened, resulting in firstly, Vietnam's exports have grown rapidly associated with free trade agreements (FTAs), especially the Garment industry; second, Vietnam must ratify international commitments, including the 1998 Declaration of the International Labor Organization (ILO) with Convention 87 - Freedom of association and protection of the right to organise convention. As a result, new non-traditional employee representative organizations will appear and create competition with traditional Vietnamese trade unions in

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attracting, gathering, developing union members, and sharing financial resources. Trade unions and workers' organizations of the new type will have different characteristics and operational purposes. In addition, the historical development factor also makes the grassroots trade union and the new type of worker's representative organization different in terms of organizational system and establishment conditions (Nguyen Thi Hong Nhung, 2019). In that context, it poses new challenges for traditional Vietnamese trade union organizations, that is, they must be ready to drastically change the organizational and operational model, and improve their capacity to bring practical benefits to the workers. Thereby, improving the ability to retain and attract workers to stick with the trade union for a long time. In this study, the research team will conduct a more in-depth study on the topic "Factors affecting the commitment of workers to grassroots trade unions in Vietnam in the new context: A Garment Business Case Study. From there, it is the basis for proposing solutions to promote the commitment of workers to grassroots trade unions at Vietnamese garment enterprises.

This study was conducted to identify and evaluate the impact of factors affecting the workers' commitment to the grassroots trade union in Vietnamese garment enterprises. Thereby proposing solutions and recommendations to help promote the commitment of workers to grassroots trade unions in the context of Vietnam's implementation of free trade agreements. The research consists of 5 main contents as follows: (i) Theoretical framework: The research team focuses on building the theoretical basis for the commitment of employees to the organization and the theoretical basis for the trade union; (ii) Research method: To study the factors affecting the workers' commitment to the grassroots trade union at Vietnamese garment enterprises, the research team used a combination of qualitative method and quantitative method; (iii) Research results and discussion: After descriptive statistics of the research sample, scale reliability analysis, exploratory factor analysis EFA, Pearson correlation, and multiple linear regression, regression equation criteria are given and the impact of the independent variables on the dependent variable is evaluated; (iv) Conclusions: From the research results, the group proposes 5 groups of recommendations to improve the commitment of workers to the grassroots trade union.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Theory of the commitment of employee to the organization**

#### **2.1.1. The concept of employee commitment to the organization**

In 1974, the research by Porter et al. suggested that employee commitment to the organization is a strong belief in and acceptance of the organization's goals, a willingness to do one's best for the organization, and a desire to remain a member of the organization.

According to Meyer & Allen (1997), employee commitment to the organization is to stay with the organization, participate in regular work, make efforts to work every day, protect the organization's assets and believe in the organization's goals.

Through the research by Robinson et al. (2004), organizational commitment is an employee's positive attitude towards the organization and its values. Engaged employees will be aware of the business situation and coordinate with colleagues to improve work performance for the benefit of the organization. Organizations must work to develop and maintain commitment which requires a two-way relationship between employer and employee.

According to Cohen (2007), organizational commitment is the employee's loyalty to the organization, the willingness to give their best efforts for the organization's goals and values, and the desire to remain a member of the organization.

For Macey & Schneider (2008), the employee’s commitment with the organization is the willingness to work actively for the organization, feel proud to be a member of the organization and have a strong attachment to the organization.

Macey et al. (2009) pointed out that employee commitment to the organization is very important because employee commitment is related to individual success and organizational effectiveness office. Employee commitment in the organization helps to predict employee performance, organizational success, and financial performance.

Through the research with different views on “Employee engagement with the organization”, in this study, the research team determined: *Employee commitment to the organization is a reflection of the level of long-term commitment, active participation and pride in the organization, as well as willingness to introduce others to join the organization.*

### 2.1.2. Forms of employee commitment to the organization

According to O’Reilly & Chatman (1986), employee commitment to the organization is measured by Compliance: attraction because of special rewards; Identification: commitment because of the desire to integrate with the organization; Internalization: attraction due to the appropriateness, the similarity between the individual’s values and the value of the organization.



Figure 2.1: Forms of employee commitment to the organization according to O’reilly & Chatman (1986)

Source: O’reilly & Chatman (1986)

In a study by Meyer & Allen (1991), three components of organizational commitment were proposed: Affective commitment: refers to emotional attachment, close engagement, and concentration of mind in the employee’s organization; Continuance commitment: engagement because the employee perceives the high cost (opportunity cost) of leaving the organization; Normative commitment: reflects commitment based on the employee’s obligations to the organization. The model of Meyer and Allen (1991) has been accepted and used a lot in current studies.



Figure 2.2: Forms of employee commitment to the organization according to Meyer and Allen (1991)

Source: Meyer and Allen (1991)

Jaros et al (2005) have the following scales: Affective is the degree to which an individual is psychologically attached to the organization through feelings such as loyalty, feeling fond of the organization, heat love for the organization, satisfaction and feeling of belonging to the organization; Continuance is the degree to which individuals feel committed to the organization because they have to lose so much if they leave the organization; Moral is the degree to which an individual is psychologically attached to an organization through assimilation of the organization's goals, values, and mission.



**Figure 2.2: Forms of employee commitment with the organization according Jaros et al (2005)**

Source Jaros et al (2005)

## 2.2. Theory of Trade Union Organization

In Article 1 of the Trade Union Law 2012 and the 2013 Constitution, the concept of trade unions is as follows: “Vietnam’s trade unions are socio-political organizations of the working class and workers established on a voluntary basis, representing workers, taking care of and protecting the legitimate and legitimate rights and benefits of workers; participating in state management, socio-economic management; participating in inspecting, supervising the activities of state agencies, organizations, units and enterprises on issues related to the rights and obligations of workers; propagating and mobilizing workers to learn, improve their qualifications and professional skills, comply with the law, build and protect the country”.

The Human Resources Law 2003 of Indonesia stipulates: “The trade union is an organization formed by the employees, by the employees and for the employees within the enterprise itself or outside an enterprise and is an a free, open, independent, democratic organization responsible for fighting, protecting and protecting the rights and benefits of workers, and at the same time promoting the improvement of the welfare of workers and their families”.

According to Ho Chi Minh’s point of view: “The trade union organization is first of all for workers to get along with each other for sympathy, secondly to study together, thirdly to correct the way workers live, fourthly to preserve the rights of workers and the last is to help the nation and the world”.

David Macdonald & Caroline Vandenabeele (1996) defined unions as follows: “An association of workers united to protect and promote their common benefits”.

Thus, trade unions are socio-political organizations, the largest mass organization of the working class and the working people. *Trade unions appear when workers are aware of their collective strength and know how to take care of their own interests. The development of trade unions is associated with the growth of the working class, with the development of industry, industry and the association of employers.*

**3. RESEARCH METHOD**

**3.1. Research method**

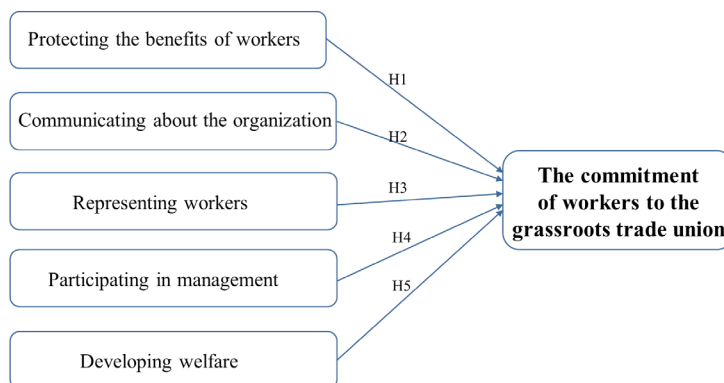
To study the factors affecting the worker’s commitment to the grassroots trade union organization in Vietnam’s Textile and Garment enterprises, the research team used a combination of qualitative research method and quantitative research method.

*For qualitative research method:* The research team used an in-depth interview method and conducted interviews with 9 individuals who are trade union officials and workers in Vietnam Textile and Garment enterprises. In order to collect opinions of interviewees about the proposed questionnaire with scales to adjust/add to suit the research context, thereby forming the official survey questionnaire. Interviewees were carefully selected to ensure representativeness according to specific criteria, including gender, number of years of experience, working position, education level,...

*For quantitative research method:* About data collection method, the study uses document research method through articles summarizing Garment Trade Union activities and Garment industry reports; monographs and specialized national and international journals to collect secondary data on the theoretical and practical basis of the research model of factors affecting commitment of workers to trade unions at Vietnamese garment enterprises. In addition, the research team used the sociological survey method using questionnaires to collect primary data on the factors affecting the worker’s commitment to the grassroots trade union. After the survey, the answer sheets are cleaned and analyzed using SPSS 26 software to create data for analysis, testing, and evaluation by appropriate techniques. There are Descriptive statistical analysis techniques; Techniques to verify the reliability of the scale; EFA analysis techniques; Correlation analysis techniques; Regression analysis techniques.

**3.2. Research model**

After researching and generalizing the theoretical basis and models from domestic and foreign studies on related topics, the research team proposed to develop a research model of factors affecting commitment of employees to grassroots trade unions in garment enterprises in Vietnam based on the inheritance and development from previous studies, especially from the study of Meyer and Allen (1991); Yasmin (2011). Therefore, the factors affecting the workers’ commitment to the grassroots trade union in garment enterprises in Vietnam will also reflect the core functions and tasks of the grassroots trade union. It is the function of protecting the benefits of workers; the function of representing workers; educational, advocacy, and propaganda function; regulatory function; management function (Immanuel Ness, 1998; Johanson and Partanen, 2002; Nguyen Hong Nhung, 2019; Nguyen Thi Diem, 2019; Bui Huu Duc and Le Thi Tu Anh, 2022; Edwing, 2005).



**Figure 3: Proposed research model**

*(Source: Compiled by the research team)*

Hypothesis of the research model:

- Hypothesis 1 (H1): Performing the function of protecting the benefits of workers has a positive effect on the commitment of workers to the grassroots trade union in garment enterprises in Vietnam.
- Hypothesis 2 (H2): Performing the function of communicating about the organization has a positive effect on the commitment of workers to grassroots trade union in garment enterprises in Vietnam.
- Hypothesis 3 (H3): Performing the function of representing workers has a positive effect on the commitment of workers to grassroots trade union in garment enterprises in Vietnam.
- Hypothesis 4 (H4): Performing the function of participating in management has a positive effect on the commitment of workers to the grassroots trade union in garment enterprises in Vietnam.
- Hypothesis 5 (H5): Performing the function of developing welfare has a positive effect on the commitment of workers to the grassroots trade union in garment enterprises in Vietnam.

## 4. RESULTS AND DISCUSSION

### 4.1. Results

#### 4.1.1. Descriptive Statistics

The research team sent survey questionnaires through Internet and social networks such as Zalo, Facebook, Email,... from 25/12/2022 to 05/02/2023. The number of votes collected was 257 votes and after screening the answer sheets, 23 invalid votes were left, and the remaining 221 valid votes (78,9%) were used for data processing.

**Table 1: Descriptive statistics of the survey sample**

	Valid	Frequency	Percentage
Age	18 - 23	86	38,9%
	23 - 35	72	32,5%
	35 - 45	60	27,3%
	Over 45	2	1,3%
Total		221	100%
Sex	Male	59	27,1%
	Female	162	72,9%
Total		221	100%
Job position	Worker	160	72,6%
	Trade union official	61	27,4%
Total		221	100%
Enterprise size	Large	128	57,9%
	Small and medium	92	42,1%
Total		221	100%
Belonging to the province	Ha Noi	103	46,5%
	Vinh Phuc	38	17,3%
	Other provinces	80	36,2%
Total		221	100%

Source: Analytical result from SPSS 26

#### 4.1.2. Cronbach's Alpha Test

The scale of independent variables: “Protecting the benefits of workers”, “Communicating about the organization”, “Representing workers”, “Participating in management”, and “Developing welfare”, systematically Cronbach's Alpha numbers are respectively: 0,914; 0,942; 0,826; 0,836; 0,726 > 0,6, this

ensures high reliability. However, the lowest corrected item-total correlation is 2 correlation coefficients of the sum of the variables RW4 (0,059) and DW6 (0,049)  $< 0,3$ , so we remove the observed variables RW4 and DW6 to retest the reliability of the scale for the second time. The reliability of the second scale shows that the variable scales “Representing workers” and “Developing welfare” have Cronbach’s Alpha coefficient of 0,894;  $0,834 > 0,6$  have high reliability, the lowest total variable correlation coefficient is higher than 0,3. Therefore, all variables are used for EFA exploratory factor analysis.

The dependent variable scale “The commitment of workers to the grassroots trade union”, with Cronbach’s Alpha coefficient =  $0,924 > 0,6$  ensures high reliability. The lowest corrected item-total correlation coefficient of 0,792 was higher than 0,3, showing that all observed variables were used for EFA exploratory factor analysis.

**4.1.3. The Exploratory Factor Analysis (EFA)**

When analyzing EFA for independent variable factors, the results show that the coefficient KMO =  $0,85 > 0,5$ ; The sig significance level of Bartlett’s test =  $0,000 < 0,05$  satisfies the condition, so it can be said that the observed variables are correlated with each other. These indexes satisfy the conditions for the exploratory factor analysis model. There are 5 factors extracted based on eigenvalue  $> 1$ , so these 5 factors summarize the information of 26 observed variables based on EFA in the best way. The total variance that these 5 factors extracted is  $71,035\% > 50\%$ . Thus, the 5 factors extracted explain 71,035% of the data variation of 26 observed variables participating in EFA. Analyzing EFA for the COM variable, the results obtained EFA are also consistent with the data because the total variance extracted is  $81,392 (>50\%)$ , KMO =  $0,671 (>0,5)$  and Bartlett’s test is statistically significant ( $\text{sig} = 0,000 < 0,05$ ). So the scale is still used for the next analysis.

Considering the Pattern Matrix component matrix table, it can be seen that the factor loading of the observed variables is greater than 0,5, so it is standard and there are no bad variables.

**Table 2: Rotated Component Matrix**

	Component				
	1	2	3	4	5
C01	0,907				
C02	0,892				
C04	0,891				
C03	0,848				
C06	0,741				
C05	0,692				
PB3		0,892			
PB4		0,887			
PB2		0,841			
PB1		0,748			
PB5		0,551			
RW6			0,885		
RW3			0,865		
RW5			0,733		
RW1			0,692		
RW2			0,639		
DW5				0,821	
DW1				0,783	
DW4				0,760	
DW3				0,689	



DW2				0,672	
PM5					0,806
PM1					0,805
PM4					0,753
PM2					0,730
PM3					0,710

Source: Analytical result from SPSS 26

#### 4.1.4. Correlation Analysis

Based on the results of Pearson correlation, the research team found that the independent variables have a linear correlation with the dependent variable because the Pearson correlation coefficient of the dependent variables for the independent variable are greater than 0,4. As for the correlation of the independent variables, the variables are correlated with each other but not too strong, so it can be considered as a temporary study without multicollinearity between the dependent variables.

**Table 3: Correlations**

		COM	PB	CO	RW	PM	DW
COM	Pearson Correlation	1	0,591**	0,555**	0,478**	0,491**	0,377**
	Sig. (2-tailed)		0,000	0,000	0,000	0,003	0,000
	N	221	221	221	221	221	221
PB	Pearson Correlation	0,591**	1	0,296**	0,559**	0,285**	0,499**
	Sig. (2-tailed)	0,000		0,000	0,000	0,000	0,000
	N	221	221	221	221	221	221
CO	Pearson Correlation	0,555**	0,296**	1	0,243**	0,383**	0,401**
	Sig. (2-tailed)	0,000	0,000		0,001	0,000	0,000
	N	221	221	221	221	221	221
RW	Pearson Correlation	0,478**	0,559**	0,243**	1	0,204**	0,418**
	Sig. (2-tailed)	0,000	0,000	0,001		0,004	0,000
	N	221	221	221	221	221	221
PM	Pearson Correlation	0,491**	0,285**	0,383**	0,204**	1	0,685**
	Sig. (2-tailed)	0,003	0,000	0,000	0,004		0,000
	N	221	221	221	221	221	221
DW	Pearson Correlation	0,377**	0,499**	0,401**	0,418**	0,685**	1
	Sig. (2-tailed)	0,000	0,000	0,000	0,000	0,000	
	N	221	221	221	221	221	221

Source: Analytical result from SPSS 26

#### 4.1.5. Regression analysis

Analyzing linear regression obtained Linear regression analysis obtained Adjusted R Square = 0,400 shows that the independent variables included in the regression analysis affect 53% of the variation of the dependent variable, the remaining 46,8% due to out-of-model variables and random error; the value of DW = 2,013 ranges from 1,5 to 2,5, so the results do not violate the assumption of first-order series autocorrelation (Yahua Qiao, 2011); sig value is less than 0,05. Therefore, the regression model is suitable.

The variables all have sig value < 0,05. Therefore, these variables are all statistically significant and all affect the dependent variable. Regression coefficients of these independent variables are all positive, so the independent variables have a positive effect on the dependent variable.

**Table 4: Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1,026	0,241		4,254	0,000		
	RW	0,409	0,070	0,419	5,880	0,000	0,596	1,079
	PB	0,162	0,052	0,190	3,093	0,000	0,799	1,252
	CO	0,161	0,059	0,184	2,706	0,000	0,653	1,531
	PM	0,064	0,053	0,093	1,203	0,001	0,505	1,679
	DW	0,066	0,072	0,079	0,919	0,002	0,407	1,758

Source: Analytical result from SPSS 26

Variables including RW, PB, CO, PM, and DW have test sig < 0,05. Therefore, these variables are all statistically significant and affect the dependent variable COM. The regression coefficients of these independent variables are positive, so the independent variables have a positive effect on the dependent variable.

Standardized regression equation:

$$COM = 0,419RW + 0,190PB + 0,184CO + 0,093PM + 0,079DW$$

Based on the magnitude of the standardized regression coefficient Beta, the order of magnitude of impact from the strongest to the weakest of the independent variables on the dependent variable COM is **RW (0,419) > PB (0,190) > CO (0,184) > PM (0,093) > DW (0,079)**.

**4.2. Discussion**

This research has built and verified a research model that identifies factors that positively affect the “The commitment of workers to the grassroots trade union” according to the decreasing level of impact, including: “Representing workers” has the strongest impact (0,419); “Protecting the benefits of workers” (0,190); “Communicating about the organization” (0,184); “Participating in management” (0,093); “Developing of welfare” (0,079).

**Table 5: Hypothesis testing results**

	Hypothesis	Standardized coefficients	Result
H3	Performing the function of representing workers has a positive effect on the commitment of workers to grassroots trade union in garment enterprises in Vietnam	0,419	Accepted
H1	Performing the function of protecting the benefits of workers has a positive effect on the commitment of workers to the grassroots trade union in garment enterprises in Vietnam	0,190	Accepted
H2	Performing the function of communicating about the organization has a positive effect on the commitment of workers to grassroots trade union in garment enterprises in Vietnam.	0,184	Accepted
H4	Performing the function of participating in management has a positive effect on the commitment of workers to the grassroots trade union in garment enterprises in Vietnam	0,093	Accepted
H5	Performing the function of developing welfare has a positive effect on the commitment of workers to the grassroots trade union in garment enterprises in Vietnam	0,079	Accepted

Source: Synthesis of the research team

For workers in Vietnamese garment enterprises, the factor “Representing workers” has an important meaning for their commitment to the grassroots trade union. This is appropriate because the main characteristics of laborers in the Textile - Garment industry are having a young age, low level of education. Therefore, they need to have a strong grassroots trade union to represent and protect their legitimate rights and benefits. However, according to the statistics of the Vietnam Confederation of Labor (in 2021), the number of strikes and collective work stoppages at garment enterprises in Vietnam always accounts for approximately 40% of the total number of strikes in the country. In which, most of the strikes are illegal, without the participation of the trade union. And most trade union organizations, especially the grassroots trade union, only know about the strike after workers did. Therefore, strikes and collective work stoppages are spontaneous and most do not follow the legal order, without the involvement of leaders of grassroots trade unions. In addition, up to 41% of enterprises assessed did not comply with collective bargaining (Better Word 10th Report). In summary, the grassroots trade union has shown a lackluster role in representing workers to protect the rights and benefits of workers when they are infringed. Therefore, trade unions need to make more efforts to affirm their role of representing workers and being solid support for workers.

The factor “Protecting the benefits of workers” has the second strongest impact on the commitment of workers to the grassroots trade union organization. Workers expect that grassroots trade unions will actively dialogue with employers to protect their legitimate benefits, in order to provide a safe and healthy working environment and conditions for workers. However, according to the survey results of over 1,000 garment workers aged 25-35 at 3 enterprises in Binh Duong, Ho Chi Minh City and Dong Nai, up to 93% of workers are tired after work, 47% body fatigue; 16,7% severe headache; 15,1% burnout; more than 80% of muscle and joint pain in the waist, neck and shoulder area (Phuong Ha, 2012; Ngoc Tu, 2015)... Occupational diseases in the garment industry are mainly cotton dust disease, varicose veins of the legs. Besides these diseases, the rate of garment workers suffering from sinusitis, allergic rhinitis, asthma, occupational chronic bronchitis, dermatitis, hearing loss, occupational deafness... is also very high. Circular No. 07/2016/TT - BLDTBXH of the Ministry of Labor – War Invalids and Social Affairs classifies the textile and garment industry in the group of industries with high risk of occupational accidents and diseases. Therefore, the Vietnam General Confederation of Labor should be more active in directing trade unions at all levels, especially grassroots trade unions, to make greater efforts in participating in the development of policies to ensure safety and hygiene labor protection at enterprises and supervise the strict implementation in order to provide a better and safer working environment for workers at factories.

The workers found that the grassroots trade union had done a good job of communicating and promoting the union’s image and activities to them. In addition, the grassroots trade union also actively propagates the labor law, quickly disseminates new regulations (the Trade Union Law, the Labor Law, the enterprise’s policies, the collective labor agreement,...) to workers, helping them understand better their legal rights and benefits. The forms of communication carried out by the grassroots trade union are very diverse, such as organizing contests: “Textile Kitchen”, “Law and Life”, “Our Roof - Trade Union” Vietnam Textile and Garment”, “To the woman I love”,... have brought about extremely positive effects and created useful playgrounds, thereby creating a source of creativity and inspiration for workers to love life and their jobs more. At that time, workers can understand better the organization, see the benefits of participating, they are more willing to increase their commitment to the grassroots trade union.

The fourth factor is the “Participating in management” factor. This factor contributes a significant part to the commitment of workers to the grassroots trade union in garment enterprises in Vietnam. This reflects the close benefits of grassroots trade union in monitoring the implementation of legal policies

and collective bargaining agreements at enterprises, which has a strong influence on the commitment of workers to grassroots trade union. However, there is still a situation where many factories continue to fail to comply with the provisions on consultation with the union and the collective bargaining agreement approval process, not share information about the collective bargaining agreement with workers, and fail to fully implement terms of the agreement in BWV's 10th reporting period. Therefore, the participation in management of the grassroots trade union will make an important contribution to ensure the legitimate rights and benefits of workers.

Finally, the factor "Developing welfare" has the weakest impact on the commitment of workers to the grassroots trade union in garment enterprises in Vietnam. With a coefficient of 0,079, workers pay little attention to the welfare development that the grassroots trade union deploys. In recent years, the grassroots trade union has been promoting the care for the material and spiritual life of workers and their family with practical, meaningful activities in many flexible forms such as: Tet reunion; Union shelters; Trade union Tet market; Train tickets back home to celebrate Tet,... Grassroots trade unions at Vietnamese garment enterprises have visited, given gifts and encouraged 4385 workers in difficult circumstances; constructed and repaired more than 10 trade union shelters, equipped facilities, ... with a total amount of up to 3,43 billion dong and many cultural, artistic and sports activities attract a large number of workers to participate;... (Vietnam General Confederation of Labor, 2022). However, due to limited financial resources, the welfare development of trade unions, especially grassroots trade union at garment enterprises, has not yet been able to reach the majority of workers.

#### **4.3. Recommendations**

Currently, when Vietnam implements the commitment to Convention No. 87 on freedom of association and on the protection of the right to organize convention in 1998 of ILO, Vietnam General Confederation of Labor and the grassroots trade union in the garment enterprises will have to face a lot of new difficulties and challenges to compete with the new workers' representative organizations that will be born. The grassroots trade union should be ready to objectively view and evaluate the current and future practical situation. From there, overcome challenges and seize opportunities to innovate and strongly improve from models to activities, improving the operational capacity of the organization. Combining research results with practicality, the research team found that grassroots trade unions need to continuously improve operational efficiency in association with the function of representing, protecting of rights and benefits for workers. Grassroots trade unions become workers' organizations, by workers and for workers. In addition, it is necessary to improve the communication quality of the grassroots trade union and effectively develop the welfare regime for workers. In order to promote the commitment of workers with grassroots trade union, the research team has proposed 5 groups of specific solutions, including: First, solutions to improve the protection capacity of grassroots trade union for the workers; Second, solutions to improve the communication quality of grassroots trade union; Third, solutions to improve the representative capacity of grassroots trade union; Fourth, solutions to improve the quality of participation in the management of grassroots trade union; Fifth, solutions to improve the effective development of welfare for workers of grassroots trade union.

#### **5. CONCLUSION**

This study focuses on assessing the influence of factors on the commitment of workers to the grassroots trade union in Vietnam in the context of the implementation of new-generation FTAs, leading to the birth of new worker's organization. This new organization of workers will compete with the grassroots trade union.

Thus, the study on the topic of workers' commitment to grassroots trade unions in Vietnam will bring a lot of meaning, especially when the grassroots trade union is no longer the only organization representing Vietnamese workers. Moreover, in Vietnam, there is no empirical research on this topic and it is expected to make valuable contributions to promote the commitment of workers to the grassroots trade union. The topic has reviewed and inherited previous studies on factors affecting employee commitment (Mowday, Steers & Porter, 1979; Meyer and Allen, 1991; Tran Kim Dung and Morris, 2005... ) and core functions of grassroots trade union (Immanuel Ness, 1998; Johanson and Partanen, 2002;...). Thereby proposing a research model of influencing factors to the commitment of workers to the grassroots trade union in the typical context of the grassroots trade union and Vietnam. We discussed and tested the factors affecting the commitment of workers to the grassroots trade union, from the perspective of the worker's representative organization at the enterprise through the implementation of core functions of the grassroots trade union. Prior studies only focus on the commitment of employers to the organization, from the perspective of the enterprise and through the implementation of the core function of the enterprise. Or only consider the important role and core functions of trade unions in labor relations.

Through the results of empirical research, the study has some new contributions. The research results, it shows that there is an interactive relationship between the functions of the grassroots trade union organization and the commitment of workers to the grassroots trade union through the values that the grassroots trade union brings to workers. The implementation of core functions of the grassroots trade union contributes to improving the union's competitive advantage compared to the new worker's organization. On the other hand, creates the faith of workers in grassroots trade union, which can positively influence the workers' decision to commit to the grassroots trade union. Thereby, proposing 5 groups of solutions associated with core tasks, further promoting the role of representation and protection for workers of grassroots trade union, and contributing to promoting the commitment of workers to grassroots trade union in the context of implementing new-generation free trade agreements. However, the study also has limitations. The study was conducted with a small sample size and limited to the garment industry. Therefore, further studies can exploit these limitations, broadening the scope of the study.

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## THE EFFECT OF PERSONAL FACTORS ON THE INTENTION TO BUY FASHION PRODUCTS ON THE SOCIAL NETWORK TIKTOK SHOP OF GEN Z IN HANOI

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**ABSTRACT:** *Research the impact of the factors of TikTok Shop on buying behavior of fashion products on the basis of information acceptance theory. Research has found that there are 03 groups of TikTok Shop factors that affect buying behavior, including Perceived usefulness (PUS), Reputation level (RL), Perceived risk (PRK), Reference group (RGR). From there, the proposed solutions to improve the activities of TikTok Shop towards Gen Z customers lead to the intention to buy fashion products.*

**Keywords:** *Influential factors, intention to buy, fashion products, TikTok, GenZ*

### 1. INTRODUCTION

TikTok ranks 6th in the favorite social networking platforms in Vietnam. TikTok has a fast growth rate in Vietnam compared to other country markets in Southeast Asia. In the first 3 months of 2019, TikTok reached 12 million monthly regular users. As of the end of 2018, each Vietnamese user spent an average of 28 minutes a day on TikTok. According to GlobalWebIndex, 90% of TikTok users visit the app more than once per day. According to Digiday, users access the TikTok app an average of eight times per day. According to MarketingCharts, about 50% of TikTok's global users are under the age of 34, with 26% between 18 and 24 (Luong Hanh, 2020).

TikTok appeals to Gen Z due to the platform's messaging characteristics. TikTok mainly focuses on short-form video content, which is easier to use and go viral on the app than other social media platforms. It perfectly responds to Gen Z's desire to be creative themselves. TikTok has developed new features for TikTok Shops to sell merchandise to people who visit this app.

The development of information technology and the trend of digital transformation have spurred the strong development of online shopping. TikTok is one of the platforms. It developed from an entertainment medium into the TikTok Shop. TikTok Shop is growing day by day and it is of high interest among young generation of Z. One of the items that Gen Z is interested in is fashion product. The transmission of electronic domains on the internet has a great influence on the purchasing decisions of young people belonging to gen Z. Therefore, it is necessary to study the impact of personal factors on the buying behavior fashion products of gen Z. From there, providing solutions in the direction of promoting the decision to buy fashion products on TikTok Shop of Gen Z customers.

Gen Z (Generation Z) aka Gen Tech, Gen Wii, Digital Natives, Neo-Digital Natives, Net Gen, Plurals, Zoomers, Internet Generation, Generation Z, iGen, iGeneration, Founders, Post millennials, Homeland Generation

<sup>1</sup> 57C2.

<sup>2</sup> TMU.

or post-Millennials, etc. are phrases that refer to a group of people born between 1995 and 2012. Most of Generation Z members have been exposed to and used technology since childhood, so they feel very comfortable with technology, mobile, Internet and social media, from Facebook, Google, Youtube, Instagram, etc. Gen Z can use and find information quickly and without spending. a lot of work but not necessarily highly digital.

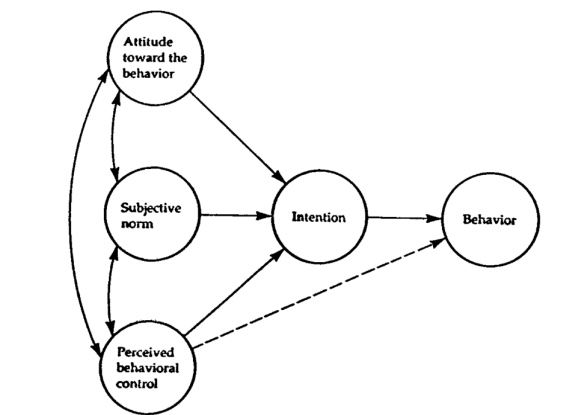
**2. LITERATURE REVIEW**

In this study, the theory of planned behavior is the theoretical basis combined with the information acceptance theory used to build the model.

**2.1. Theoretical models**

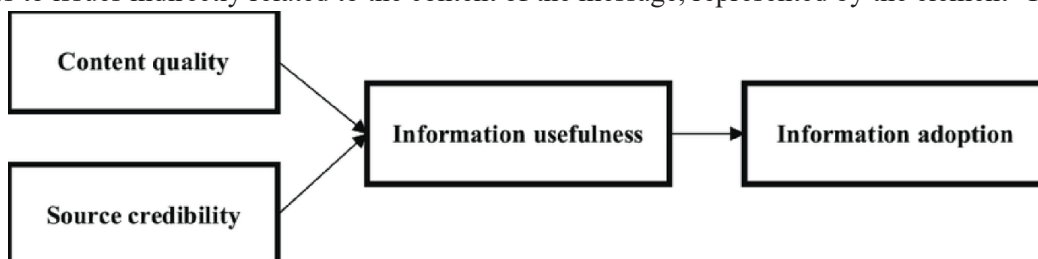
The Theory of Planned Behavior (TPB) started as the Theory of Reasoned Action in 1980 to predict an individual’s intention to engage in a behavior at a specific time and place. The theory was intended to explain all behaviors over which people have the ability to exert self-control.

The TPB has been used successfully to predict and explain a wide range of behaviors and intentions. The TPB states that behavioral achievement depends on both motivation (intention) and ability (behavioral control). It distinguishes between three types of beliefs - behavioral, normative, and control. The TPB is comprised of six constructs that collectively represent a person’s actual control over the behavior. That are attitudes, behavioral intention, subjective norms, social norms, perceived power, perceived behavioral control (Ajzen Icek, 1991).



**Figure 1. Theory Planned Behavior**

Information Acceptance Theory (IAM) is a model proposed by Sussman and Siegal (2003). This model combines technology acceptance theory and information processing trends model (ELM). The theory of this model suggests that before a message, shoppers are influenced by two factors: central and peripheral. The focus is on the inner content of the message represented by the element of “information quality”. Peripheral refers to issues indirectly related to the content of the message, represented by the element “Reliability”.



**Figure 2. Information Acceptance Theory**

*(Nguồn: Sussman và Siegal, 2000)*



Studies on buying behavior show that, there are 04 groups of factors that affect buying behavior and specifically the purchase intention of consumers, including cultural, social, personal and psychological factors. In which, factors related to individual demographic characteristics, psychological characteristics of consumers have a great influence on purchase intention. Especially factors related to individual cognitive problems, the reference group characteristics of Generation Z have a great impact on their purchase intention. Due to the group of young people their cognitive and psychological factors, and the factors belonging to the reference group have a great influence on their decisions. Therefore, based on the theoretical bases, the personal factors: Perceived usefulness, Reputation level, Perceived risk; Reference group are selected into the research model.

## **2.2. Perceived usefulness**

Perceived usefulness is defined as “The degree to which a person believes that using a system will improve his or her job performance” (Davis, 1989). Perceived usefulness of purchasing on TikTok Shop includes the convenience of finding reviews, product selection, and accurate information. Much of the previous research has pointed to convenience and time saving as the main reasons why customers shop online at TikTok Shop. The consumer’s motivation to use online services g (Jarvenpaa & Todd, 1997) is its usefulness, new technology. Burke (1998) can conveniently purchase at any time and place.

## **2.3. Reputation level**

The reputation of online sellers, of TikTok Shop is similar to perceived usefulness. It is the perception of consumers or potential customers about the prestige and reputation of a fashion product brand and the brand of TikTok Shop. The perception and assessment of the reputation of the TikTok Shop and the seller in the TikTok Shop is not only related to the seller’s images, but also depends on the customer’s reviews and feelings. The results of previous studies show that consumers trust online selling points such as online retail websites and social networks. If consumers perceive that the business has a good reputation and is reputable to the public (Lin et al., 2010), they will trust more and choose to buy at stores.

## **2.4. Perceived risk**

Perceived risk is also known as risk perception. It is the buyer’s perception of the risks associated with products/services sold at the TikTok Shop. Consumers are also very concerned about product/service risks, risks related to online transactions: seller fraud, payment problems, exchange and return, information security.

Product risk in online shopping at TikTok Shop is high because potential customers cannot check with five senses and test product quality and have no choice to substitute (Hsu et al. , 2013, Garbarino & Strahilevitz, 2004).

Product risks in online shopping, especially for new entrants or newbies because buyers cannot check and test product quality before making a decision Besides, Lin et al. (2010) also stated that the risk of losing money, not being able to deliver, or having wrong delivery has a negative impact on online shopping behavior intention.

## **2.5. Reference group**

Reference groups are “groups of people who have an influence on the formation of customer attitudes, perceptions and behaviors towards a product, brand or business” (Vu Huy Thong, 2010). The reference group includes: friends, family, colleagues, the mass media... Especially for the young generation of the Z group, it is often greatly influenced by the member group, and the idol reference group. The opinion of the reference group can affect consumer confidence in online vendors and in TikTok Shops, and in fashion goods sold in TikTok Shops.

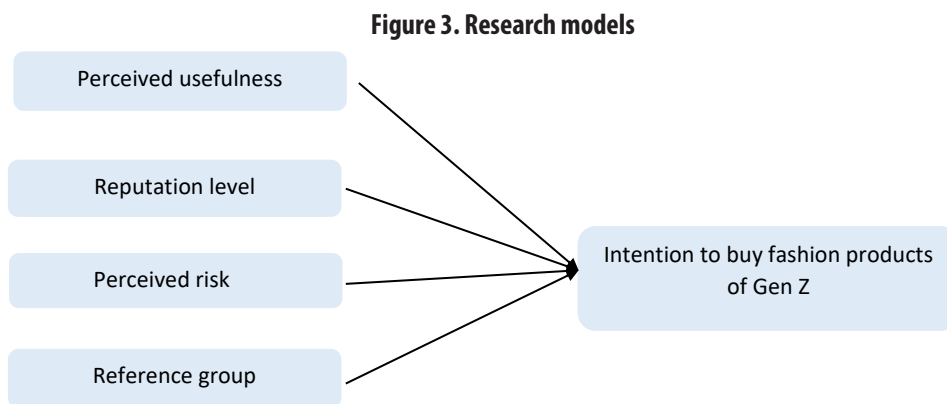
Consumers' intention to use online purchases is dominated by others involved. According to research by Senecal and Nantel (2002) for reference sources of information when buying products online can be divided into three main categories: consumers who have had experience in using the product, the opinions of experts. Research experts on that product field and the system to support consumers' purchasing decisions such as the company's support and consulting staff.

### 2.6. Intention to buy

Purchase intention of a customer or buyer, is the tendency to buy the product or service of that customer or buyer. Purchase intention is considered as a composite of motivational factors influencing a behavior; they are an indication of how much effort people are willing to put in, the level of effort they intend to make to perform the behavior." (Ajzen, 1991, p.181).

## 3. RESEARCH MODELS AND HYPOTHESES

Research conducted to find the level and direction of impact of individual factors that affect the intention to buy fashion products on TikTok network. The research model includes three independent variables, which are personal factors and one dependent variable on the intention to purchase fashion products on GenZ's TikTok Shop in Hanoi.



Source: Research team

From the above research model, there are the following research hypotheses:

H1: Perceived usefulness has a positive influence on Gen Z's intention to buy fashion products on TikTok Shop in Hanoi.

H2: Reputation level has a positive influence on Gen Z's intention to buy fashion products on TikTok Shop in Hanoi.

H3: Perceived risk has a negative effect on Gen Z's intention to buy fashion products on TikTok Shop in Hanoi.

H4: The reference group has a positive influence on Gen Z's intention to buy fashion products on TikTok Shop in Hanoi.

## 4. RESEARCH METHODOLOGY

To test the model hypothesis, the research team has launched surveys to collect data to have information to perform the steps of hypothesis testing of the research model.

Qualitative research. In order to complete the study of the observed variables measuring the variables of the model, the in-depth interview method was carried out. The research team conducted interviews with 3 young people of Gen Z, who are interested in buying fashion products through Tiktok Shop. The interview results are the basis for adjusting the observed variables to better match the reality of gene Z.

Quantitative research. Research on the evaluations of Gen Z youth's assessment of the influence of the observed variables of the variables in the model was included in the survey questionnaire. The survey was conducted in the city area of Hanoi. The respondents are the generation Z (born between 1995 and 2012), who is considering to buy on TikTok . The research team distributed 700 questionnaires on "Google form" sent to list of email, FB of student belong to the generation Z in January 2022. After the survey, 698 questionnaires was collected. There are 657 questionnaires were returned valid (accounting for 93.85%).

The research team sent online survey questionnaires by convenient sampling method. The questionnaires were built Choose to send to current and potential customers who are Gen Z who are studying and living in Hanoi city. Surveys are sent via Messenger and Gmail to each of the Gen Z youths, students, and their friends who belong to the Gen Z group. In addition, the group also posted surveys on some Facebook groups of interested gen Z such as GenZ Universe, Genz Strange, etc.

## 5. RESEARCH RESULTS

To test the hypothesis of the research model, the reliability of Cronbach's Alpha scale is evaluated. The next step is to perform an exploratory factor analysis (EFA). The next step is to analyze the correlation between the independent variables and the dependent variables. Finally, regression analysis on the relationship between individual factors of buyers affecting the intention to buy fashion products of Gen Z youth on TikTok Shops.

Among the respondents are those who have been intending to buy fashion products on TikTok Shop. Regarding the frequency of online shopping, 34.09% of respondents buy 1-2 times/month, 49.32% of respondents buy 3-4 times/month, 16.59% of respondents buy more than 5 times/month. Regarding the average spending for one-time online shopping, the level below or equal to 500,000 VND/time has 38.35%; 500,000 - 1,000,000 VND, accounting for 28.76%; 1,000,000 - 2,000,000 VND, accounting for 15.22%; 2,000,000 - 3,000,000 VND, accounting for 11.11% of the total number of respondents.

To test the hypothesis of the research model. First, the research team analyzed the reliability of the collected data. The results of reliability analysis (see Table 1) of the elements constituting the scales, including all independent variables and one dependent variable, have Cronbach's Alpha > 0.7. The total correlation of the observed variables is greater than 0.3. Therefore, all observed variables will be used for exploratory factor analysis (EFA).

**Table 1. Analysis reliability of variables**

Variables	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Eliminated
Perceived usefulness	Cronbach's Alpha = 0.891		
	PUS1	0.719	0.874
	PUS2	0.762	0.859
	PUS3	0.796	0.845
	PUS4	0.765	0.858
Reputation level	Cronbach's Alpha = 0.819		
	RL1	0.687	0.738
	RL2	0.641	0.785
	RL3	0.692	0.731

Perceived risk	Cronbach's Alpha = 0.867		
	PRK1	0.714	0.833
	PRK2	0.708	0.835
	PRK3	0.660	0.846
	PRK4	0.697	0.838
	PRK5	0.607	0.844
Reference group	Cronbach's Alpha = 0.831		
	RGR1	0.663	0.785
	RGR2	0.615	0.806
	RGR3	0.677	0.779
	RGR4	0.686	0.775
Intention to buy fashion products of Gen Z	Cronbach's Alpha = 0.835		
	PI1	0.738	0.732
	PI 2	0.703	0.708
	PI 3	0.698	0.690
	PI 4	0.715	0.706
	PI 5	0.595	0.669

Source: Analysis of survey data on SPSS

Second, exploratory factor analysis (EFA) was conducted. To determine the appropriateness of factor analysis, KMO and Bartlett’s test should be performed. KMO value = 0.900 > 0.5 and significance level sig. is 0.000, so factor analysis is suitable to meet the requirements in EFA exploratory analysis.

**Table 2 KMO and Bartlett Test**

KMO Measure of Sampling Adequacy		0.900
Barlett Test	Approx. Chi - Square	1300.897
	df	153
	Sig.	.000

Source: Analysis of survey data on SPSS

From the results of EFE analysis, we see that all values meet the conditions, we get the rotation matrix as in Table 3.

Factor rotation matrix

**Table 3 Matrix rotation results**

Rotated Component Matrix				
	Component			
	1	2	4	4
PUS3	.813			
PUS1	.728			
PUS2	.592			
PUS4	.544			
RL1		.523		
RL3		.540		
RL2		.517		
PRK1			.767	
PRK3			.762	
PRK4			.746	
PRK2			.737	

PRK5			.699	
RGR1				.557
RGR2				.526
RGR3				.516
RGR4				.506
Extraction Method: Principal Component Analysis.				
Rotation Method: Varimax with Kaiser Normalization.				
a. Rotation converged in 3 iterations.				

Source: Analysis of survey data on SPSS

The analysis results of the rotation matrix show that the load coefficients of all factors are greater than 0.5 to meet the requirements. Thereby, we can conclude that the customer's purchasing decision scale is influenced by 5 factors with a total of 19 observed variables.

The first factor is perceived usefulness (PUS) consisting of 4 observed variables with codes from PUS1 to PUS4. This is also the strength of the "booths" on TikTok Shop to attract customers to buy products. Especially today's GenZ group often tends to learn more about product information before making a purchase.

The second factor is the Reputation Level (RL) of the product and of the TikTok Shop, consisting of 3 observed variables with codes from RL1 to RL3. GenZ is an object with its own "color". They are willing to test new products. However, they still want the reputation of the product over time and according to the information provided by the TikTok Shop about the reputation of products and of the Shop.

The third factor is perceived risk (PRK) including 5 observed variables with codes from PRK1 to PRK5. The convenience of purchasing on TikTok has not yet made GenZ friends forget about potential risks. These risks are product-related, transaction-related, and personal information when purchased on TikTok Shop.

The fourth factor is the Reference Group (RGR) consisting of 4 observed variables with the codes of Designers1 to Designers4. GenZ tends to rely on the comments or information of a member reference group or aspirational reference group. Information on TikTok social network from opinion leaders / or influencers (KOLs / Influencers), and the influence of opinion leading consumers is also increasing.

The third step, correlation coefficient analysis was performed between 05 independent variables and 01 dependent variable (Table 4), we can see that all independent variables are correlated with the dependent variable intention to purchase products. fashion products on TikTok. Thus, the regression function of the research group at this time still has enough 05 factors that are correlated with the p-value =  $0.00 < 0.05$ , which can be concluded to be statistically significant.

**Table 4. Pearson's Correlation**

	PI	PUS	RGR	PR	RL
PI	1.000				
PUS	0.638	1.000			
RGR	0.619	0.509	1.000		
PRK	0.561	0.610	0.483	1.000	
RL	0.554	0.427	0.602	0.530	1.000

Source: Analysis of survey data on SPSS

The fourth step, on analysis, is to determine the level of impact of 5 independent variables on the dependent variable. The first is to analyze the fit of the model, Table 5 has analyzed the model summary

showing that the adjusted R-squared coefficient is 0.691. That is, 69.1% variation of the dependent variable of intention to buy fashion products on TikTok is explained by 05 independent variables.

**Table 5: Model Summary**

Model Summary <sup>b</sup>					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.831 <sup>a</sup>	.691	.685	.502	1.962
a. Predictors: (Constant), PUS, RL, PR, RGR					
b. Dependent Variable: PI					

Source: Analysis of survey data on SPSS

Table 6 shows the results of the analysis on the overall fit of the model. The results in the table show the value  $F = 44,565$  with  $sig = 0.000 < 0.05$ . Show that the R-squared of the population is not 0, this means that the linear regression model built is suitable for the population.

**Table 6 Results of model fit analysis**

ANOVA <sup>a</sup>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	43.856	4	10.964	44.565	.000 <sup>b</sup>
	Residual	35.919	146	.246		
	Total	79.775	150			
a. Dependent: PI						
b. Independent: PUS, RL, PR, RGR						

Source: Analysis of survey data on SPSS

Fifth, the results of the regression analysis on the impact of the independent variables on the purchase decision of the intention to purchase fashion products in Table 7 show that all the regression coefficients are significant due to sig. are all less than 0.05, and there is no multicollinearity between the variables because the VIF values of the variables are all less than 2.

**Table7. Regression analysis**

Coefficients							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	B
(Constant)	.415	.258		1.449	.149		
PUS	.321	.076	.322	3.798	.000	0.681	1.469
RL	.106	.066	.113	1.611	.000	0.737	1.356
PR	-.302	.066	-.310	-4.589	.014	0.845	1.183
RGR	.160	.069	.168	2.316	.000	0.727	1.357
a. Dependent: PI							

Source: Analysis of survey data on SPSS

All variables have a positive influence on GenZ’s intention to buy fashion products on TikTok in Hanoi, RR (- 0.302) is negative, which shows that the perceived risk factor negatively affects GenZ’s intention to buy fashion products on TikTok in Hanoi.

From the regression table as follows:

$$PI = 0.415 + 0.322 PUS - 0.310 PR + 0.168 RGR + 0.113 RL$$

Thus, through determining the reliability of Cronbach Alpha, analyzing EFA for independent variables and regressors. The model is separated into 4 independent factors affecting 1 dependent variable. So from here, the research team comes up with the following new hypothesis:

H1: Perceived usefulness has a positive influence on Gen Z's intention to buy fashion products on Tik Tok in Hanoi.

H2: Reputation level has a positive influence on Gen Z's intention to buy fashion products on Tik Tok in Hanoi.

H3: Perceived risk has a negative effect on Gen Z's intention to buy fashion products on Tik Tok in Hanoi.

H4: Reference groups have a positive influence on Gen Z's intention to buy fashion products on Tik Tok in Hanoi.

## **6. RECOMENDATION**

The analysis results show that there are 03 factors that have a positive impact (Perceived usefulness, Reference group, Reputation level) and 01 factor have a negative impact (factor Perceived risk) on the intention to buy. Shop for fashion products on GenZ's TikTok in Hanoi. The level of impact of these factors in descending order is: Perceived usefulness (0.322), Perceived risk (-0.310), Reference group (0.168), Reputation level (0.113).

The results from the study show that perceived usefulness and quality of information are quite important when considering buying fashion products on the Tiktok platform. The more useful information is, the more it strengthens consumer confidence. Maybe they have never known the product or brand before, but if the usefulness of the information is high, it can create trust. Fashion businesses, the first thing to focus on is to improve the quality of information sources on Tiktok Shop. Information should be easy to understand, clear and objective. Businesses need to pay attention to the form and decoration of TikTok pages. The interface of the page should be eye-catching and elegant. Categories should be clearly displayed, easy to find so that visitors do not feel inconvenient or difficult to use. Each topic on the page should have easy-to-find keywords so that readers find it convenient to find information and feel that the information is trustworthy.

There is a need to reduce perceived risk for potential customers when they make purchases on TikTok Shops. Specifically, sellers on Tiktok Shop need to provide accurate information about the product both in terms of shape and characteristics of the product, style characteristics, and color of the product. Especially the material and form of the product must be exactly as the information. Moreover, it is necessary to ensure the safety and confidentiality of information for users.

To increase the credibility of Tiktok Shop, businesses need to create conditions for consumers to share information, or advice from other online consumers. Especially, today, consumers are more interested in other people's opinions than seller's advertising information. To be able to improve trust, businesses should strengthen the expansion of multiple communication channels from consumers to consumers or influencers.

The influence of influencers needs to be exploited. Consumers often consult friends and family before buying certain products. Especially when it is a new product, the above information is extremely important and useful to them. If using KOLs or KOCs, it is necessary to pay attention to the selection of KOLs to suit the Gen Z group.

## **7. CONCLUSION**

Thus, in order to catch up with the development trend of the Internet in general and the Tiktok social network in particular, along with the demand for online purchases, marketers need to consider doing business

through TikTok Shops. It is necessary to implement effective communication to increase the influence of information acceptance, increase the level of information reliability and combine with the influence of the reference group. For the Tiktok platform, businesses can also develop more features, design an increasingly eye-catching interface that is easy to use. Thereby, the business also brings valuable information, perception of risks to Gen Z young people to motivate them to intend to buy fashion products sold at TikTok Shop.

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## FACTORS AFFECTING THE DECISION OF CHOOSING A GREEN LOGISTICS CENTER

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**ABSTRACT:** *As the awareness of environmental sustainability grows, the field of green logistics has gained significant attention in recent years. Green logistics centers, which focus on minimizing environmental impacts while optimizing logistics operations, have emerged as viable solutions for sustainable supply chain management. In this research paper, we investigate the factors that affect the decision-making process in choosing a green logistics center in Haiphong, Vietnam, using the Fuzzy Analytic Hierarchy Process (AHP) method. This paper aims to identify and prioritize the key factors that influence the decision to choose a green logistics center in Haiphong. The research results show that out of the four main criteria, infrastructure is the most important, the second most important criteria is policy, followed by technology and services, respectively. In addition, the study has ranked the sub-criteria of the main criteria from 1 to 14, which is presented clearly in the table 9. This research paper contributes to the literature on green logistics by providing insights into the decision-making process of choosing a green logistics center in Haiphong. The findings of this study can be valuable to businesses and policymakers in finding the right direction in building a green logistics center and related policies as well as attracting clients' attention.*

**Keywords:** *green logistics center, green logistics, effect criteria, Fuzzy Analytic Hierarchy Process*

### 1. INTRODUCTION

The logistics industry is a vital component of global trade, but it is also one of the most polluting sectors, responsible for 8% of total CO<sub>2</sub> emissions globally. In the Mekong region, including Vietnam, logistics is a fragmented sector that relies on outdated infrastructure and vehicles, leading to high fuel demand and increased CO<sub>2</sub> emissions. According to the Worldbank, the ranking is 39/160 with 3.72 points. The logistics cost in Vietnam is LPI of Vietnam in 2021 accounts for 16.8% value of goods, meanwhile, this cost in the world is just 10.6%. World Bank statistics in 2019 show that road has a very large amount of gas emissions, accounting for 85%, followed by inland waterway transport 10% and air transport 5%. Therefore, the development of green logistics together with a green logistics center has become a common trend worldwide, and Vietnam is no exception. However, the existing literature on green logistics often tends to focus on broader concepts and strategies, such as environmental regulations, green technologies, and overall sustainability practices. There is still a lack of research on the establishment and development of Green Logistics Centers in Vietnam. Moreover, Vietnam has not yet developed and systemized common measures for green logistics such as the set of criteria to measure the level of green logistics development or the green logistics performance index. The research and construction of a Green Logistics Center has not been concerned and studied. According to the master plan to develop the logistics center system in the whole country to 2020, with a vision to 2030, approved on July 9, 2015, the government only focuses on building and developing traditional logistics centers and no green orientation for these centers. The government has just issued the Green Port Development Project in Vietnam approved by the Ministry of Transport on October 29, 2020, without a development orientation and strategy for green logistics centers. In Vietnam, up to 73.2% of surveyed enterprises said that green logistics was in their business strategy, and nearly 65% of surveyed enterprises also said that they have carried out

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environmental control in the enterprise. In which, 66.2% of logistics enterprises said that they do not have an environmental management system that meets ISO.14001 standards.

Hai Phong, the northern port city, in Vietnam, is a great place to build and develop a Green Logistics Center. It has a well-developed infrastructure, a strong transport network, a growing economy, and many supportive policies to encourage sustainable development. All these criteria make Hai Phong City an ideal location for the construction and development of a Green Logistics Center. Besides, Hai Phong is an industrial city with a population of 2,053,493 and an average population growth rate of 0.94%/year. The volume of cargo through Haiphong is expected to double from 2020 to 2030.

This study evaluates the criteria affecting the decision of choosing the Green Logistics Center in Hai Phong City. The object of the study is the factors affecting the choice of a green logistics center in Hai Phong, accordingly, the issues that four key criteria were identified: infrastructure, policy, technology, and services. These criteria are broken down into 14 sub-criteria that will be ranked according to their relative importance in the choosing of the Green Logistics Center.

The results of the study will provide valuable insights into the challenges and opportunities associated with the choice of a Green Logistics Center in Hai Phong City. By examining 14 sub-criteria in each of the four main criteria, the study aimed to identify the most important criteria affecting the success of the Green Logistics Center. Through analysis and evaluation of criteria affecting the selection of a green logistics center to propose solutions to develop a green logistics center in Hai Phong.

The study uses the approach of the “Fuzzy hierarchical analysis process” to evaluate the criteria affecting the decision of choosing the Green Logistics Center in Hai Phong City. The analysis results will be presented in the form of a rating, highlighting the most important criteria and sub-criteria to consider in the process of building and developing the Green Logistics Center.

## **2. THEORETICAL FRAMEWORK**

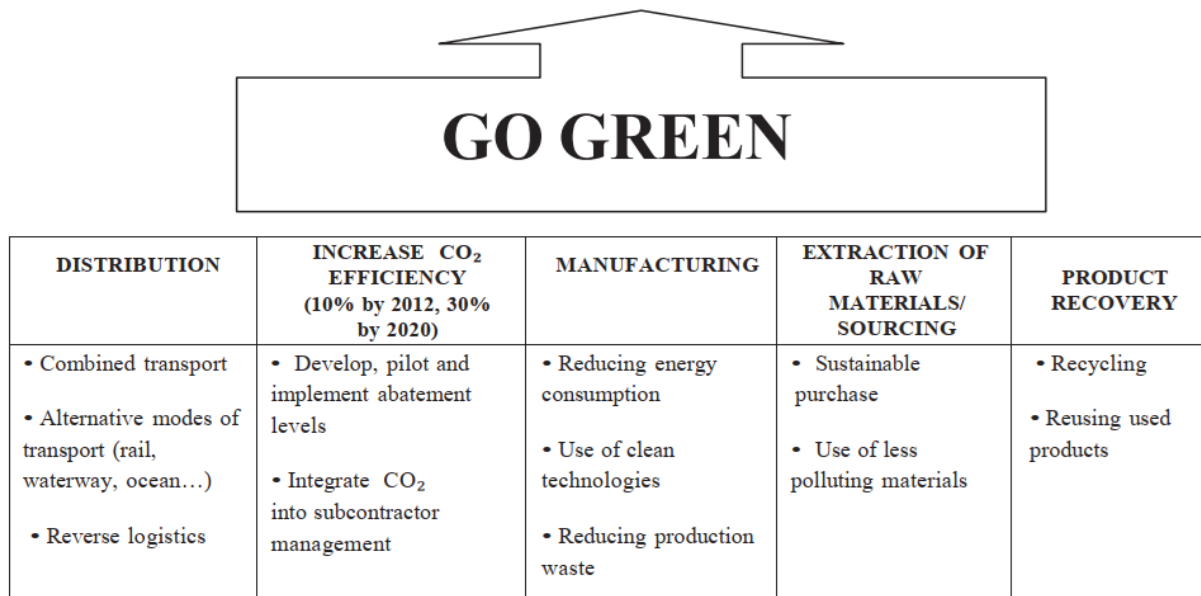
### **2.1. Theory of green logistics**

Logistics centers are divided into two approaches: the transport infrastructure and a generator of business. The transport infrastructure is an intermodal terminal, while the generator of business is a way of measuring and providing advantageous and competitive conditions for enterprises.

The concept of green logistics originated in the mid-1980s and is a concept to describe logistics systems and methods that use advanced technology and equipment to minimize environmental damage during operation without affecting the environment and still increase the use of resources in the system to meet customer requirements. According to Sibihi & Eglese (2009), green logistics activities include measuring the environmental impact of different distribution strategies, reducing energy use in logistics operations, reducing waste, and managing its operations. According to Mesjasz-Lech (2011), green logistics includes all activities related to the ecologically efficient management of forward and reverse flow planning of products, information between the point of origin and the point of consumption in order to meet or exceed customer needs. The study of A.K.M. Mohsin, et al (2022) shows the component of Green Logistics, which is the operation of green supply chains, including green procurement, green transportation, green distribution, and green delivery of environmentally friendly logistics. The research illustrates the relationship between Green Logistics and the environment, allowing industrial activities to avoid the risks associated with non-green operations, leading to ecological sustainability. The study also demonstrates the interaction between Green Logistics and economic growth, increasing market share and buyer faithfulness and advancing corporate financial growth.

**2.2. Theory of Green Logistics Center**

Darko Babiü, et al (2012, p.337) in the “Development of Green logistics centers”, the authors represent the idea of how to develop and apply “green” to the transportation industry and how to develop a “green” logistics center.



**Figure 1. Principles of logistics going green**

*Source: (D. Babiü, 2012), Development of green logistics center.*

The authors also assert that a sustainable logistics center should be judged by how it fits into a finely tuned-supply chain. Although this offers a checklist of various building improvements and operational standards to implement in a logistics center for achieving a “green” facility, following the result of the study in the article, when applying LEED certification in a warehouse sector from Gazeley of a subsidiary of Wal-Mart Stores, a mere 8 percent of building’s impact on the environment occurs during construction. In the study of the “Green Logistics Center Location and Allocation Problem”, the environmental sustainability of the logistics network is enhanced by using multi-objective optimization and carbon tax regulation to optimize the carbon dioxide emissions of the logistics network. The paper also asserts that the logistics industry should take responsibility for controlling carbon dioxide emissions. Irina Harris and co-worker critically examined current techniques for infrastructure modeling as applied to ‘real-world’ supply chains.

**2.2.1. Green logistics center in Vietnam**

Global logistics corporations are implementing green logistics, which is both economically and environmentally sustainable. Saigon Newport Company, Vinafco Corporation, and Gemadept Joint Stock Company have all implemented green logistics initiatives, such as the application of container management software systems at Cat Lai port, the installation of the first green logistics center solar power system in Vietnam, and the use of IT in port management and operation on a large scale. These initiatives have contributed to increasing the cargo handling capacity 3 times before, making Tan Cang - Cat Lai the first port of Vietnam to apply, and reducing CO2 emissions by nearly 1000 tons/year. Vinafco has also invested in a solar power system of 500.96 kWp to save 4.5% of electricity costs per month during the contract term, and 30% after the end of the 12-year contract. Gemadept Joint Stock Company has been providing customers with a logistics center system to ensure an operating supply chain.

### **2.2.2. Green logistics center in other countries**

L. A. F. Rose et al (2017) in the research: Green Logistics Implementation in Malaysian Logistics Industry proposes a way to apply green logistics by using green transportation, green storage, green packaging, green technology, and reverse logistics via a case study. In terms of green transportation, companies should design the layout of the infrastructure in order to save energy and cost such as using natural lighting, installing roof-mounted solar panels, adequate floors, heat-absorbent solar walls, etc. In terms of green storage, companies should design the layout of infrastructure in saving energy and cost, such as using natural lighting, installing roof-mounted solar panels, adequate floors, heat-absorbent solar walls, etc. In terms of green technology, companies should use cutting-edge technology to enhance the management and administration efficiently. In terms of reverse logistics, companies should reuse the heavy-duty wooden pallets and consolidate transportation from various partners to cut down the transportation cost and offer better reverse logistics services for clients.

The German government has invested heavily in logistics centers to optimize routes and facilitate the combination of transport modes, minimizing energy consumption and emissions. Greenhouse gas emissions are expected to be 80-95% by 2040. In 2014, the German government approved an action plan of 100 solutions to achieve the set goals, creating opportunities for domestic enterprises to invest in renewable energy and pursue green logistics. DHL with GO Green service compensates for CO<sub>2</sub> emissions from the transportation process, providing paper Go Green certification for partners.

### **2.3. Relevant factors for choosing a green logistics center**

According to Yan Sun et al (2019) in the area of a Green Logistics Center, it is important to identify the location, allocation, and research method to build a center. The location of a green logistics center is essential for its success, as it can affect transportation costs, efficiency, and environmental impact. It should also provide easy access to transportation infrastructure, green technology, and a skilled workforce. According to EUROPLATFORMS EEIG (2004) the Logistics Center has to connect with road, rail, and port to support its activities. The most crucial infrastructures inside a Logistics center are the warehouse and intermodal terminal. According to the study "Development of green logistics centers" by D. Babiuc et al (2012) Logistics Centers are essential infrastructure components of the macro-logistic system, facilitating an appropriate distribution of labor and improving productivity. Multimodal transport is often more cost-effective than relying solely on road transport. In the research paper: "A Review of infrastructure modeling for green logistics", Irina Harris et al (2007, p.3), building infrastructure modeling is a vital part of Green Logistics. This activity includes the optimum number, location, and allocation of the facilities; whereas implying "an environmentally friendly and efficient transport distribution system" (Rodrigue et al, 2001). Green equipment and green design can reduce the environmental impact of logistics operations and can help logistics centers comply with regulations and avoid penalties.

Digitalization is the process of using digital technologies to improve business processes, such as cloud computing, telematics systems, and ICT. "Advanced technological solutions, such as telematics systems, can be used to monitor and control the supply chain, as well as to reduce emissions and improve efficiency." (Edvardsson et al., 2018). "Design of a warehouse management system for a logistics center" by Y. Wang, X. Chen, and Y. Liu (2019). This paper describes the design and implementation of a warehouse management system for a logistics center. The authors propose a system architecture that includes a database management system, an inventory management module, and a warehouse layout optimization module. L. A. F. Rose et al (2017, p.2) in the research: Green Logistics Implementation in Malaysian Logistics Industry identifies that the

user of cutting-edge technology offers companies to enhance the management and administration efficiently via freight forwarding software, warehouse management system, transport management system, and E-shipping document software. Moreover, Monitoring and Control System (MCS) are important tools in managing the operations of a green logistics center. It is a system that plays an auxiliary role in warehouse management as well as transportation operations, making the supply chain work more efficiently, saving time and costs.

According to expert opinion, government incentives and support are important criteria for green logistics, while government restrictions can limit the cost and effectiveness of green logistics operations. Legal consistency across countries is also important to ensure that green logistics is implemented consistently and efficiently globally. For example, in 2014, the German government approved an action plan of 100 solutions to achieve the set goals, these policies have created opportunities for domestic enterprises to invest in and improve the use of renewable energy, and pursue green logistics, thereby gaining a competitive advantage for the company and reducing dependence on imported energy.

According to expert opinion, green packaging services, customer service, and reverse logistics are all important factors in green logistics, helping to reduce emissions and reduce negative impacts on the environment. L. A. F. Rose et al (2017, p.3) in the research: Green Logistics Implementation in Malaysian Logistics Industry identifies that packaging is also an aspect that the company innovates to drive green packaging. As for reverse logistics, reusing heavy-duty wooden pallets, and consolidating transportation from various partners to cut down the transportation cost and offer better reverse logistics services for clients.

#### 2.4. Research gap

Up to now, many scientific studies referring to implementing green logistics in general and in Northern Vietnam in particular, focusing on the main issues such as concepts, the role, development, challenges, and potentials of green logistics. However, in the perspective of finding the factors that decide the choice of customers in choosing green logistics centers, very little research has been conducted. Even though these factors were mentioned before, it remains challenging to determine their significance to customers. By addressing the gaps in the topic, we aim to evaluate and prioritize such factors which can help investors understand market trends and develop effective strategies to fully utilize green logistics centers in Haiphong. The information obtained from this study will serve as a basis for making informed decisions and maximizing opportunities in the market.

In terms of deciding the set of factors that affect the choices of GLC, a careful reference from previous research was taken. In addition, as the author carried out intensive interviews with experts in the field, a review of such factors was implemented to determine the most suitable ones for the customers in Haiphong. The set of criteria includes 4 main criteria and their 14 subfactors as described below.

**Table 1. The criteria affecting the choosing of a Green Logistics Center**

Code	Criteria	Description
Policy criteria		
PC1	Government's encouragements on GL	The policies, regulations, financial incentives, public awareness campaigns, and research and development support provided by governments to encourage the adoption of sustainable and eco-friendly practices in GL
PC2	Government's inadequacy on GL	The lack of effective policies and regulations put in place by governments to encourage the adoption of sustainable and eco-friendly practices in GL
PC3	The compatibility in policies for green logistics development with other countries.	The adoption of similar policies and practices by different countries to promote sustainable and eco-friendly GL

Technology criteria		
TC1	Warehouse management information system	Software application that helps manage and optimize warehouse operations
TC2	Transport and delivery technology	The technology used for transporting goods from one place to another, which includes vehicles, machinery, tools, software, and communication technologies.
TC3	Monitoring and control system	A system that continuously monitors and regulates the performance of a process, equipment, or system using sensors, instruments, and software to provide real-time feedback to operators.
Infrastructure criteria		
IC1	Modes of transport	The different methods used for moving people or goods from one place to another. The main modes of transport include air, water, rail, road, and pipeline.
IC2	Location	Location refers to the physical location of supply chain nodes, such as warehouses, manufacturing plants, and distribution centers, in relation to each other and to the transportation network.
IC3	Safety conditions and environmental protection	Involve measures to ensure safety and protect the environment and complying with regulations to prevent accidents
IC4	Eco-friendly design and equipment	Involve designing logistics systems and transportation networks that are environmentally sustainable
IC5	Efficiency	The ability to maximize the use of resources, minimize waste, and reduce environmental impact in logistics process
Service criteria		
SC1	Packing service	Packaging goods for transport while minimizing the environmental impact of packaging materials
SC2	Customer service	Providing support to customers while promoting environmentally sustainable practices.
SC3	Reverse logistics	Managing the flow of products and materials back to the point of origin for reuse, recycling, or disposal in an environmentally responsible way.

The above-listed factors are being taken into consideration while performing FAHP in this research.

### 3. RESEARCH METHODS

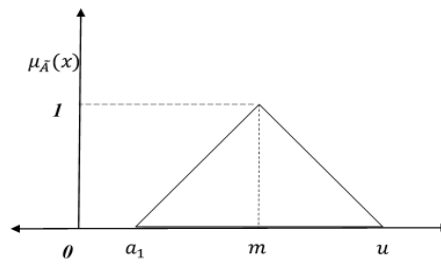
#### 3.1. Fuzzy AHP Methodology

The objective of this research is to assess the practicability of choosing a green logistics center. The main inquiry is to determine the critical factors that must be taken into account when considering a green logistics center. To address this question, multi-criteria decision-making (MCDM) is an appropriate method for ranking. MCDM includes various tools such as the Analytic Network Process (ANP), the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), and Simple Additive Weighting (SAW). In this particular study, Fuzzy Analytic Hierarchy Process (FAHP) is used due to its appropriateness. FAHP is capable of managing uncertain and imprecise data through the utilization of fuzzy logic. Fuzzy logic assigns membership values to elements of a group to represent uncertain or unclear data, making it ideal for decision-making scenarios where data is incomplete or uncertain. FAHP facilitates the integration of various expert opinions and stakeholders in the decision-making process. FAHP's hierarchical structure offers decision-makers the ability to simplify complicated decisions by dividing them into smaller, more feasible components, enabling them to evaluate decision criteria and options at various levels of detail. Additionally, FAHP incorporates uniformity checks to ensure that decision criteria and alternatives are assessed uniformly across all experts, reducing prejudice and enhancing the decision-making process's dependability.

Data from the survey sheet can be denoted by  $\tilde{A}(x) = (l, m, u)$ , with the membership function

$$\mu_{\tilde{A}(x)} = \begin{cases} 0, & x < l \\ \frac{x-l}{m-l}, & l \leq x \leq m \\ \frac{u-x}{u-m}, & m \leq x \leq u \\ 0, & x > u \end{cases} \quad (1)$$

All of the functions  $\mu_{\tilde{A}}(x)$  can be graphically illustrated in Figure



The steps to apply FAHP are as follows:

**Step 1:** Expert input was needed in order to build a fuzzy pairwise comparison matrix. Following the collection of their responses, the matrix was made using the next procedure:

$$\tilde{D} = \begin{bmatrix} \tilde{a}_{11} & \tilde{a}_{12} & \dots & \tilde{a}_{1n} \\ \tilde{a}_{21} & \tilde{a}_{22} & \dots & \tilde{a}_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \tilde{a}_{n1} & \tilde{a}_{n2} & \dots & \tilde{a}_{nn} \end{bmatrix} \quad (2)$$

The value was used to determine the decision maker’s preference for the criteria. If is represented by a triangle fuzzy number, such as  $(a^l, a^m, a^u)$ , one can calculate the corresponding triangular fuzzy number for  $(\frac{1}{a^u}, \frac{1}{a^m}, \frac{1}{a^l})$ .

**Step 2:** Equation (3) was used to calculate the fuzzy geometric mean as part of the procedure for evaluating the criteria. For each criterion, the fuzzy pairwise preference matrix was examined, and the geometric mean was computed as a result.

$$\tilde{r}_i = \left( \prod_{j=1}^n \tilde{a}_{ij} \right)^{\frac{1}{n}}, \quad \forall i = 1, 2, 3, \dots, n \quad (3)$$

**Step 3:** Compute criteria’ fuzzy weight:

Fuzzy weights  $\tilde{w}_i$  of each criterion  $i$  were calculated by:

$$\tilde{w}_i = \tilde{r}_i \times \left( \sum_{i=1}^n \tilde{r}_i \right)^{-1} \quad (4)$$

**Step 4:** Defuzzy fuzzy weights:

Center of area approach was used to convert  $\tilde{w}_i = (w_i^l, w_i^m, w_i^u)$  into defuzzy weight  $(w_i)$

$$w_i = \frac{[(w_i^u - w_i^l) + (w_i^m - w_i^l)]}{3} + w_i^l \quad (5)$$

**Step 5:** Normalize crisp weights:

The normalized weight  $(N_i)$  for each criterion is obtained by:

$$N_i = \frac{w_i}{\sum_i w_i} \quad (6)$$

### 3.2. Data gathering

Participants in the study had extensive knowledge and experience in the areas of logistics, supply chain management, and transportation. They consist of 3 specialists working for shipping lines, 4 professionals in



freight forwarding, and 3 experts researching logistics and supply chain. In *Table 2*, descriptions of experts are provided. These experts were chosen based on their capacity to offer knowledgeable perspectives on the study subject. A pilot survey was done with a small group of specialists to evaluate the clarity and applicability of the questions in order to guarantee the quality and reliability of the data. A survey approach was utilized to collect the data for the study, which included a series of pairwise comparisons of the criteria and sub-criteria. The survey's objective was to determine whether using a green logistics center was feasible. The experts were asked to give each pairwise comparison a numerical value between 1 and 9, where 1 was given equal weight and 9 was given the highest weight. *Table 3* provides a thorough description of the scale. The importance of each criterion and sub-criterion in the decision-making process was asked of the experts, and they were requested to offer their opinions and observations. In order to show the reality, benefits, and difficulties that green logistics centers are confronting, experts were also interviewed. To make sure that the experts' assessments were consistent, inter-rater reliability checks were also carried out.

**Table 2. Detail of experts**

Number of respondents	Respondent category	Experience and role
3	Freight forwarding	<ul style="list-style-type: none"> <li>• More than 10 years of experience in sales of international freight forwarding services</li> <li>• More than 6 years of experience in a managerial position</li> <li>• Bachelor's Degree in Supply Chain Management</li> </ul>
4	Shipping lines	<ul style="list-style-type: none"> <li>• Shipping Manager Qualifications</li> <li>• More than 6 years of experience in shipping management</li> </ul>
3	Researching	<ul style="list-style-type: none"> <li>• Ph.D. in Logistic major</li> <li>• More than 8 years of experience in teaching in an academic setting</li> </ul>

**Table 3. The scale of importance for the Fuzzy-AHP analysis**

AHP scale	Meaning	Convert into triangular fuzzy scale
1	Equally important	(1, 1, 1)
3	Weakly important	(2, 3, 4)
5	Fairly important	(4, 5, 6)
7	Strongly important	(6, 7, 8)
9	Absolutely important	(9, 9, 9)
2	Intermittent values	(1, 2, 3)
4		(3, 4, 5)
6		(5, 6, 7)
8		(7, 8, 9)

## 4. RESULTS AND DISCUSSION

### 4.1. Results and Analysis

Infrastructure considerations are rated first shown in *Table 4* and *Figure 2*, then policy criteria (PCs), technology criteria, and service factor. This outcome highlights the importance of infrastructure as a key factor influencing the decisions of customers. The second biggest issue is government policy. Below, the importance of the subfactors and their fuzzy ranking are examined. The infrastructure category, with a normalized weight of 0.479, gets the highest rank. This indicates that out of the four criteria, it is regarded as the most crucial. With a normalized weight of 0.316, the policy criterion is ranked second. Lower rankings are achieved by the technology and service criteria, which have normalized weights of 0.144 and 0.061, respectively.

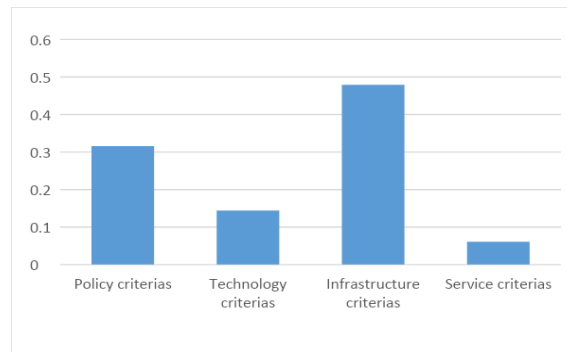


Figure 3. Normalize weight of main criteria

Table 4. Fuzzy and equivalent crisp weights of main criteria

Criteria	Fuzzy weight for criteria	Crisp weight for criteria	Normalized weight	Rank
Policy criteria	(0.215, 0.288, 0.483)	0.329	0.316	2
Technology criteria	(0.121, 0.118, 0.210)	0.150	0.144	3
Infrastructure criteria	(0.304, 0.616, 0.575)	0.498	0.479	1
Service criteria	(0.044, 0.055, 0.090)	0.063	0.061	4

We consider the secondary criteria after assessing the primary variables.

Among the policy concerns of PCs, the focus of experts is more on initiatives taken to encourage the development of GLC rather than restrictions imposed on GLC. This is highlighted in *Table 5*, where uniform legal regulations (PC3) are the next most important concern.

Table 5. Weights and rank of the sub-criteria of economic criteria

Sub-criteria	Local fuzzy weight for sub-criteria	Local crisp weight for sub-criteria	Normalized weight	Rank
PC1	(0.427, 0.627, 0.893)	0.649	0.620	1
PC2	(0.194, 0.280, 0.420)	0.298	0.285	2
PC3	(0.069, 0.094, 0.135)	0.099	0.095	3

The warehouse management information system TC1 remains a major concern among TFs. Transport and forwarding technology PC2, monitoring and control system PC3 follow, as shown in *Table 6*

Table 6. Weights and rank of the sub-criteria of infrastructure criteria

Sub-criteria	Local fuzzy weight for sub-criteria	Local crisp weight for sub-criteria	Normalized weight	Rank
TC1	(0.495, 0.659, 0.863)	0.672	0.656	1
TC2	(0.213, 0.275, 0.366)	0.285	0.278	2
TC3	(0.052, 0.066, 0.085)	0.068	0.066	3

Assessment of the importance of the ICs factors are ranked in *Table 7*. Design of the center, its efficiency and location are considered to be top three influential sub-criteria, respectively.

Table 7. Weights and rank of the sub-criteria of policy criteria

Sub-criteria	Local fuzzy weight for sub-criteria	Local crisp weight for sub-criteria	Normalized weight	Rank
IC1	(0.077, 0.081, 0.132)	0.096	0.094	4
IC2	(0.087, 0.141, 0.150)	0.126	0.122	3
IC3	(0.028, 0.037, 0.051)	0.039	0.038	5
IC4	(0.311, 0.407, 0.546)	0.421	0.409	1
IC5	(0.239, 0.334, 0.470)	0.348	0.338	2

Of the three service criteria (SCs) which are shown in *Table 8*, the main sub-criteria selected is reverse logistics (SC3), whereas packaging service (SC1) has received the least attention.

**Table 8. Weights and rank of the sub-criteria of geographical criteria**

Sub-criteria	Local fuzzy weight for sub-criteria	Local crisp weight for sub-criteria	Normalized weight	Rank
SC1	(0.124, 0.095, 0.222)	0.147	0.141	3
SC2	(0.156, 0.250, 0.352)	0.253	0.242	2
SC3	(0.423, 0.655, 0.849)	0.642	0.616	1

*Table 9* contains a summary of the data, and the formula for determining the overall weight of sub-criteria is calculated as the product of criteria weight and local weight. This creates a way to rank and compare the significance of different sub-criteria. The most prominent factor is the government's encouragement of GL (PC1), followed by design of warehouse (IC4) and warehouse efficiency (IC5). The ranking also includes warehouse management information system (TC1) and the effectiveness of loading and government's restrictions on GL (PC2) in fourth and fifth positions respectively.

**Table 9. Summarizing local weight, global weight and rank of criteria and sub-criteria**

Criteria	Criteria weight	Criteria rank	Sub-criteria	Local weight	Local rank	Global weight	Rank
Policy criteria (PCs)	0.316	2	PC1	0.620	1	0.196	1
			PC2	0.285	2	0.090	5
			PC3	0.095	3	0.030	10
Technology criteria (TCs)	0.144	3	TC1	0.656	1	0.094	4
			TC2	0.278	2	0.040	8
			TC3	0.066	3	0.009	13
Infrastructure criteria (ICs)	0.479	1	IC1	0.094	4	0.045	7
			IC2	0.122	3	0.059	6
			IC3	0.038	5	0.018	11
			IC4	0.409	1	0.196	2
			IC5	0.338	2	0.162	3
Service criteria (SCs)	0.061	4	SC1	0.141	3	0.009	14
			SC2	0.242	2	0.015	12
			SC3	0.616	1	0.037	9

## 4.2. Discussion

Using the AHP methodology, our investigation revealed the level of interest among logistics professionals in green logistics and other related aspects. The ranking of criteria shows that experts representing those who want to use customers who want to use green logistics centers in Hai Phong are more interested in policy and infrastructure criteria than technology and service criteria.

Based on the insights provided by the interviewed specialists, infrastructure is considered as the most critical factor in distinguishing a green logistics center from a conventional one. It is imperative for customers to have access to environmentally-friendly equipment at the center, as it helps in reducing emissions. Since green logistics is a relatively new concept, customers often have queries about government policies. Companies are paying close attention to the incentives and limitations in the policy to establish a well-functioning green logistics center. In Vietnam, it is crucial to incorporate advanced technology systems, but due to insufficient funds, there is a lack of consistency in technology. As a result, users are not particularly interested in technological aspects. Additionally, when establishing a logistics center, it is essential to consider service standards. Despite being overlooked, experts recognize this as a critical

criterion that only becomes evident after the customers have chosen and utilized the center's services, making it challenging for customers to evaluate immediately.

Concerning the prioritization of secondary criteria, government incentives are the most significant factor to customers, as the investment in a new center with technological advancements requires substantial capital investment, leading to high operational expenses. Therefore, the government's policies, such as tax exemptions and creating credit funds to facilitate access to green logistics for investors and customers, are crucial. The "green" design of the center is ranked second in the evaluation criteria. The differentiation brought by the "green" aspects in our research must be clearly manifested in this secondary criterion. Investors need to invest in and equip the infrastructure and technology in the center to minimize the environmental impact of logistics operations and impress potential customers, convincing them to utilize the center's services. Additionally, efficiency in the utilization of the aforementioned infrastructure and superstructure must be ensured, avoiding any negative impact on operational efficiency and ensuring environmental protection. Despite the difficulty, the implementation of automation technology is necessary. Replacing human operators with an information management system for warehouse operation helps reduce costs and time, saving resources and energy while meeting the green criteria for the center.

#### **4.3. Current status of green logistics**

Currently, there is little research on the general challenges of developing green logistics in the country. Studies have identified barriers to the adoption of green logistics practices in Vietnam, including the lack of government policies, technology, infrastructure, and services. Detail:

- ***Policy***

State policies can play an important role in facilitating the development of green logistics, ensuring sustainability and efficiency in the management and operation of the logistics system. Financial support can be provided to enterprises and organizations engaged in green logistics development. Processes and regulations can be adapted, such as implementing standards and regulations on emissions, energy consumption, waste management and reducing risks related to safety and the environment. This helps to improve proactiveness in managing and tracking progress towards these goals. Supporting research and development can also accelerate the adoption of new technologies and solve problems related to green logistics.

In the process of developing state policy on green logistics, there are a number of challenges that may arise. One is lack of capital to invest in new technology, human resource training and system update. Another challenge is the lack of clear strategic direction, leading to ambiguity in investment and development. In addition, legal issues can also hinder the development of green logistics without clear and effective regulations and policies. Finally, promoting the active participation of countries, organizations, businesses and communities can also be a challenge, especially when there is a lack of awareness and interest among stakeholders.

- ***Technology***

Presently, technology is not the main focus of green logistics development because of reasons. Some new technologies require significant initial investment, which can be difficult for SMEs to manage. New technologies require training and implementation, which can be expensive and necessitate changes in organizational structure and work processes. Different technologies may not be compatible with each other, which can be expensive and time consuming to merge. Finally, the collection and use of customer and employee data can raise security and privacy concerns.

- ***Infrastructure***

The development of green logistics centers faces a number of challenges related to infrastructure. One of the main challenges is limited land availability in urban areas, where logistics centers need to be located close to consumers to reduce transportation emissions. This leads to high land prices and limited area for logistics centers, making it difficult to build and expand facilities. In addition, green logistics centers require specialized infrastructure such as renewable energy sources, waste treatment facilities and green roofs. These infrastructure requirements can be expensive to implement and maintain. Another challenge is the need for efficient transport linkages between logistics centers and other modes of transport, such as ports and airports, to enable seamless supply chain integration.

- ***Service***

Services such as reverse logistics, customer service and packaging services are all very important in green logistics. Reverse logistics will help organizations recycle and reuse products, reduce waste and emissions during production and transportation, and bring competitive advantages to businesses. Meanwhile, good customer service not only helps to create satisfaction, but also saves shipping costs and ensures the shipping process. Environmentally friendly packaging also helps to reduce production and packaging waste.

However there still exist challenges in this factor. First, businesses often do not invest enough in improving service quality. Another one is difficulties in finding human resources specialized in logistics service consulting and service management. Moreover, measuring the effectiveness of service elements is also a difficult problem, making the investment for these factors difficult.

#### **4.4. Recommendations**

From the above backlog and research, here are our recommendations to governments, investors and other stakeholders:

- ***Policy***

To develop green logistics through state policies, it is necessary to provide solutions to remove the above difficulties. The first one is increasing investment capital such as tax exemption and reduction for new technologies and equipment in this field. At the same time, create favorable conditions to attract investors and sponsors from international organizations to support the development of green logistics. Also, we should prepare clear strategic direction. The state can develop a clear plan and strategy for the development of green logistics, along with objectives, targets and performance metrics to monitor the development process. This will help increase the synchronization and efficiency of green logistics development activities. Another one is enforcing effective regulations. The state needs to develop effective regulations to support the development of green logistics such as regulations on environmental management. Then it is necessary to enhance stakeholder engagement. To achieve maximum effectiveness in the development of green logistics, it is necessary to increase the participation of stakeholders such as organizations, businesses, communities and experts in the field of logistics.

- ***Technology***

To solve the difficulties in using technology in green logistics, there are a number of solutions that need to be applied. Firstly, we need to increase investment in technology research and development. This section includes creating new technology and improving existing technology. This reduces initial investment costs and increases computational efficiency during the development and exploitation of new technologies. The second one is training people and promoting knowledge sharing, which can help improve technology

usability and increase efficiency. This helps businesses save training costs, improve competitiveness in the market. Thirdly, using interoperability and integration standards enable different technologies to work the same, thereby reducing integration costs and increasing computational and system efficiency. Last but not least, ensuring information security and privacy is important because businesses need to ensure that customer and employee data is secured and used properly.

- ***Infrastructure***

To solve the challenges in building green logistics infrastructure, the following solutions can be implemented. Firstly, regarding government support, the government can provide financial support and encourage businesses to invest in green logistics infrastructure. Secondly, Collaboration can help share technology investment costs and share expertise during adoption. This can help ease the burden on SMEs. In terms of standards and regulations, it helps to reduce regulatory uncertainty and ensure a level playing field for businesses. Training and education including skills development programmes, seminars and workshops. Finally, innovation and research can help reduce infrastructure costs and solve technical difficulties. This may include collaboration between industry and academia.

- ***Service***

Firstly, one way to improve reverse logistics and customer service is implementing a green supply chain. This involves using environmentally friendly inputs and turning process by-products into materials that can be reused or recycled. Secondly, companies should integrate reverse logistics into the green supply chain by including it in all stages, from planning to sourcing, manufacturing and shipping. This multifactorial structure is needed to deal with the new complexities that arise in the process. Another way to improve reverse logistics is to identify the factors that influence its implementation, such as proper planning, control and execution. By understanding these factors, companies can optimize their reverse logistics processes and improve their economic outcomes. In addition, companies can improve their packaging services by partnering with green logistics centers that specialize in environmentally friendly packaging materials and techniques. This will not only improve the company's sustainability profile but also improve customer satisfaction by providing more eco-friendly packaging options.

## **5. CONCLUSION**

In summary, the decision of choosing a Green Logistics Center is an essential step to achieve sustainability in the logistics and supply chain industry. This study evaluates the factors affecting the decision of choosing a Green Logistics Center in Hai Phong City, Vietnam.

The study identified four key factors: infrastructure, policy, technology and services, which are critical to the success of the Green Logistics Center. These factors were further analyzed and it was found that infrastructure was the most important factor, followed by policy, technology and services.

Analysis of 14 sub-factors in each of the main factors shows government incentives, green design and eco-friendly equipment, effectiveness, and compatibility between Vietnam's green logistics development policy and other countries, are the most important factors to build and successfully develop the Green Logistics Center in Hai Phong city.

In theory, the study has systematized the theoretical basis as well as the existing studies on Green Logistics in general and Green Logistics Center in particular. While previous studies focused on the implication of "green" to Logistics in Vietnam, this study has identified and evaluated the factors influencing the decision of choosing a Green Logistics Center in Hai Phong.

In practice, the study has shown that the infrastructure factor is the most important and decisive factor in choosing a Green Logistics Center in Hai Phong. From there, it helps businesses, as well as investors, have a realistic view of investing and building a Green Logistics Center.

In terms of application, the study proposes solutions for each of the above impact factors for businesses, customers, and the government to promote the development of a Green Logistics Center in Hai Phong.

In short, the study demonstrates the importance of considering many primary and secondary factors when selecting the construction and development of Green Logistics Centers. The Fuzzy Hierarchical Process Methodology used in this research can be applied to other decision-making processes, especially those involving subjective and uncertain criteria. The study highlights the need to continue to research and develop sustainable and eco-friendly logistics practices to promote a greener and more sustainable future.

In spite of the fact that giving noteworthy supplementation to the past writing, the think about has a few confinements which ought to be taken into consideration whereas deciphering the comes about due to the time limitations. The test estimate is generally little which may not be agent of the whole clients. Also, comfort inspecting strategies were utilized to enroll members which may have caused testing predisposition. The information collected through self-report measures may have socially alluring inclinations and may be influenced by response inclinations. In spite of the fact that namelessness and secrecy were guaranteed to play down these predispositions, they still may have influenced the comes about. The cross-sectional plan of the consider does not permit for causal inductions, which is another confinement. Finally, the ponder was conducted in two master bunches without including important government partners, so the discoveries may not generalize to the impediments of building a green coordinations center in Northern Vietnam. In spite of these confinements, this consider gives critical bits of knowledge into the variables impacting the decision of choosing a green coordinations center and lays the establishment for future investigate within the future.

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## THE ANTECEDENTS OF PURCHASE INTENTION ON SOCIAL NETWORKING APPS OF GENERATION Z IN VIETNAM

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*ABSTRACT: Social networking apps are strongly influencing consumption trends in Vietnam, in which Facebook, Instagram, and TikTok are the most popular platforms with the most consumers, mainly Gen Z. Accordingly, this study was conducted to assess the antecedents of purchase intention of Gen Z on social networks based on the theory of information acceptance model (IAM) and adding Trust and perceived prices. A survey method using an online questionnaire was used to collect data from 663 Gen Z in Vietnam. The collected data was then analyzed with structural equation modeling (SEM). Research results show that constructs positively affect Gen Z's purchase intention on social networks, namely Perceived price, Trust, and Information adoption. The findings also reveal that Information adoption is influenced by Information quality, quantity, and credibility. From the research results, the authors have proposed several solutions for enterprises/ sellers on social networking apps to promote purchase intentions of Gen Z on social networking apps in Vietnam.*

*Keywords: Social networking apps; Gen Z; purchase intention; Vietnam.*

### 1. INTRODUCTION

In recent years, using communication media has become a habit and lifestyle of global residents. A report revealed by eMarketer (2023) exposed that the average daily hours spent on mobile phones is more than 3 hours per user. According to Hootsuite's Digital 2022: Global overview report (2022), the number of regular social media users in Vietnam is 76.95 million, accounting for 78.1% of the total population. Social media users are also quite active, with the average time used in a day being 2 hours 28 minutes, higher than the average time of users worldwide (2 hours 27 minutes). The best reason is that the ongoing Covid-19 pandemic has significant impacts on most parts of the world, leading to enormous challenges at the root of lifestyle and the global economy. The heavy impact of the Covid-19 pandemic has motivated the development of e-commerce as a modern and fast-growing business model, as more companies worldwide sell their products on social media and other websites or platforms (Ngo et al., 2022).

The existence of the terms "Digital era" or "Industry 4.0 technologies", which appeared in 2011, is one of the most successful revolutions. Accordingly, the 4.0 revolution has sparked a new method of marketing called Marketing 4.0. In addition, the Internet, along with the advancement of social networks such as Facebook, Instagram or TikTok, has changed how consumers can buy and have the space to approach with the opinions and reviews of products. For example, TikTok, an application, is easy to use and simple to make a video, has attracted rapid growth in users. TikTok users not only watch live streaming and short videos but also go shopping on TikTok shops. The study by Schellewald (2021) shows that TikTok has become one of the most popular short video communities. TikTok has formed a unique business model which has notable differences between TikTok and other e-commerce exchanges on traffic source, page design, and content display (Ouyang et al., 2021). However, research on purchase intentions on such social networking

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apps in Vietnam is not abundant. Therefore, based on the Information Adoption Model (IAM), the study investigates the impact of factors, such as perceived price (PRC), trust (TR), and information adoption (IA) on Gen Z consumers' purchase intention (PI) in Vietnam. Additionally, the results give valuable marketing suggestions for enterprises and sellers on social networking apps.

## 2. THEORETICAL BACKGROUND AND HYPOTHESES

### 2.1. Theoretical Background

The Theory of Reasoned Action (TRA) postulated by Fishbein and Ajzen (1975) originated from the areas of social psychology. This model determines the relationship between Trust, Attitude, Norm, Intentions and Behavior of individuals.

According to TRA, the intention to perform the behaviour is the most crucial factor determining human behaviour. Behavioural Intention is influenced by a person's attitude about the behaviour and the Subjective Norm related to the behaviour.

IAM (Information Adoption Model) is formed from the combination of The Technology Acceptance Model (TAM) and The Theory of Reasoned Action (TRA), considered to be more capable of explaining information-receiving behaviours than just using theories like TAM and TRA. In IAM, Information quality, Information quantity, and Information credibility are drivers of information adoption.

### 2.2. Hypotheses

Information quality is defined as the strength of the content embedded in information (Yeap et al., 2014). Moreover, information quality plays a material role in consumers' evaluation of products and services (Filiari & McLeay, 2014). The concept of information quality is a factor that is accurate, complete and timely in providing information that meets the expectations of information users. As social media users can easily access information, the quality and credibility of information become more important to consumers (Reichelt et al., 2014; Erkan & Evans, 2016). Information quality is supposed to be the power of a persuasive message in influencing consumer purchase intention (Park et al., 2007; Yeap et al., 2014). Park et al. (2007) discovered a strongly positive relationship between information quality and purchase intention.

**Hypothesis 1.** *Information quality has a significantly positive effect on information adoption.*

The quantity of information refers to the total number of eWOM reviews (Duan et al., 2008), comments, likes (Cheung & Thadani, 2010), and ratings (Pihlaja et al., 2018). eWOM (Electronic word of mouth) refers to any positive or negative statement made by potential, former or actual customers about product or company which is made available to the multitude of people via the internet (Hennig-Thurau et al. 2004). According to Matute (2016), perceived usefulness mediates the effect of eWOM quantity on online repurchase intention. The more reviews are posted online on social travel websites, the more information is gainful to potential customers' purchase decisions (Chowdhury & Deshpande, 2020). Higher star ratings for hotels have increased online visibility (Neirotti et al., 2016). Young people are more affected by the higher average rating of customers in the online purchase decision process than older people (Helvesen et al., 2018). Neirotti et al. (2016) emphasize that quantitative information should complement the quality information related to the content of eWOM.

According to Park et al. (2007), the number of reviews has been potential to cause consumers to rationalize their purchase decisions by saying to themselves: "Many other people have also bought this product". In addition, referring to word of mouth (reviews of others) is a risk reduction strategy that can help reduce or eliminate discomfort from exposure to risk (Buttle, 1998). Therefore, purchase intention

will increase with the number of online reviews of customers. We have therefore proposed the following hypothesis.

**Hypothesis 2.** *Information quantity has a significantly positive effect on information adoption.*

According to Wathen and Burkell (2002), information credibility is the initial factor in personal persuasion. This judgement determines how much the recipient learns from it and takes in the information. Thus, if people believe the information received is reliable, they will have more confidence to apply eWOM information and use it to make purchasing decisions (Sussman & Siegal, 2003). Previous studies have also shown a relationship between information credibility and consumer purchase intention (Park et al., 2007). Based on the IAM model, the research team predicts that information credibility is also positively related to information adoption other than purchase intention. Hence, the author formulated the following hypothesis.

**Hypothesis 3.** *Information credibility has a significantly positive impact on information adoption.*

The information adoption of the knowledge transfer process concludes that when a user profiles his or her goals to adopt a behavioural element or technology, he or she models specific desires to apply distinctly favoured concepts, behaviours, and beliefs (Sussman et al., 2003). In that sense, information acquisition is a process in which people engage in purposeful use of information.

The behaviour of information adoption is one of the main activities of users to seek to proceed in virtual communities (Cheung et al., 2008). The information-receiving factor is significant because it explains how satisfied a person is with the information received. They, furthermore, agree that information is necessary and momentous, as well as ensuring the validity of the information and affects purchase intention (Erkan & Evans, 2016). Information adoption is one of the factors that have a nonstop and positive impact on the online purchase intention of consumers (Abedi et al., 2019; Erkan & Evans, 2016; Leong et al., 2022; Song et al., 2021). In addition, results from some recent studies confirm that information adoption positively impacts purchase intention on TikTok (Yones et al., 2022; Yang & Lee., 2022). Based on the above discussion, the following hypothesis is proposed.

**Hypothesis 4.** *Information adoption has a significantly positive effect on purchase intention.*

According to Tolulope Folarin (2016), in the online shopping model trust of consumers regarding security and privacy is mandatory. In the increasing popularity of online shopping, previous studies have emphasized the importance of trust as a significant predictor of consumers' attitudes and purchase intentions (Lin, 2011; Hsu et al, 2013). Therefore, the following hypothesis is proposed:

**Hypothesis 5.** *Trust has a significantly positive effect on purchase intention.*

Price is the amount a consumer pays to obtain a product or service (Philip Kotler et al., 2015). Previous studies have all shown that price is one factor that strongly affects consumers' purchase intention (Meghna, 2019). Consumers often believe high prices indicate high-quality products. Therefore, the authors hypothesize the following hypothesis:

**Hypothesis 6.** *Perceived price has a significantly positive effect on purchase intention.*

### 3. RESEARCH METHODOLOGY

#### 3.1. Questionnaire and measures

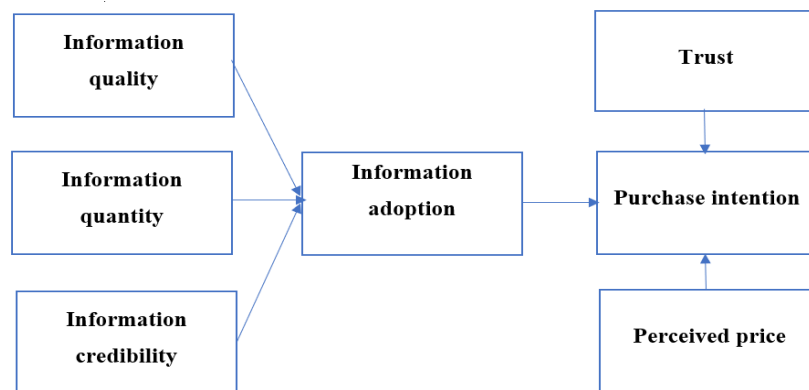
The questionnaire was translated from the original English into Vietnamese using forward and reverse translation (Nguyen et al., 2023). To ensure the validity and reliability of the measurements, most of the measurement units of the constructs were changed from the validated scales of previous studies as part of the research of this work. To ensure the validity of the measures, 02 marketing experts were invited

to review the questionnaire. In addition, 25 students shopping on social networking apps were asked to voluntarily participate in a pilot test to check the wording and meaning of the work.

The final questionnaire consists of three parts, which are as follows: The introduction, demographic questions, and measurement items of the seven constructs. All measures were designed on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

The construct of Information quality was developed from the studies of Khwaja & Zaman. (2020), Abedi et al. (2019), Yones et al. (2022), Leong et al. (2022), Yang & Lee (2022), and Park et al. (2007), including 06 observed variables coded from IQ1 to IQ6. Based on the scales in the studies of Yones et al. (2022) and Song et al. (2021), the construct of Information quantity, including 06 observed variables, was established and coded from IQn1 to IQn6. For the construct of Information credibility, the authors developed four observed variables from the studies of Abedi et al. (2019), Leong et al. (2022), Yones et al. (2022), and Erkan & Evans (2016), coded from IC1 to IC4. The construct of Information adoption was based on the scale in the studies of Abedi et al. (2019), Yones et al. (2022), Song et al. (2021), Leong et al. (2022), Erkan & Evans (2016) and Khwaja & Zaman (2020), including 05 observed variables coding from IA1 to IA5. The construct of Trust was developed from the works of Jarvenpaa (2000) and Nguyen et al. (2019), including six observed variables, denoted from TR1 to TR6. The construct of Perceived price was based on the scale in the studies of Lien et al. (2015), including three observed variables, coded from PRC2 to PRC4 while the authors developed PRC1. Finally, the scale to measure Gen Z consumers’ purchase intention was developed from the studies of Khwaja & Zaman (2020), Yones et al. (2022), Leong et al. (2022), Song et al. (2021) and Erkan & Evans (2016), including five observed variables, coded from PI1 to PI5.

Based on the literature review, a research model on the antecedents of purchase intention on social networking apps of generation Z in Vietnam is established.



**Figure 1. Proposed Research Model**

**3.2. Data Collection and Sample**

Due to the widespread use of the Internet, researchers have adopted online surveys. An online survey was conducted for Gen Z consumers in Vietnam who had purchased via social networking apps. The authors use convenience sampling on social media sites. The questionnaire was created using Google Forms software and was sent via Zalo and Facebook to approximately 1,000 respondents. In our message, we specifically stated the academic purpose of the survey. We emphasized that the data collected is used only for research purposes, will be completely confidential, and will not be disclosed commercially.

The data was collected in two months, from November to December 2022. After removing inconsistent responses, the remaining 663 respondents (91.1%) were used to analyze and confirm the research hypotheses.

SPSS and AMOS 22 (IBM, New York, NY, USA) were used to perform the data analysis. The sample profile is shown in Table 1.

**Table 1: Sample Profile**

Demographic Variables		Quantity	Percentage (%)
Gender	Male	187	69
	Female	454	28
	Non-binary	22	3
Education	College	27	4
	Undergraduate	576	8
	Graduate	13	2
	Others	47	7
Occupation	Student	453	68
	Employee/Employer	35	5
	Student with part-time job	134	20
	Housewife	3	1
	Others	38	6
Monthly income	Less than 10 million VND	571	86
	10 million VND – 19 million VND	53	8
	20 million VND – 29 million VND	18	3
	More than 30 million VND	21	3

## 4. RESULTS

### 4.1. Reliability of Cronbach's Alpha

Cronbach's Alpha coefficients of all seven constructs are greater than 0.7 (Table 2). The correlation coefficient in each variable is greater than 0.4. Therefore, 36 observed variables in seven constructs were kept to continue conducting exploratory factor analysis.

**Table 2. Reliability and standardized factor loadings**

Thang đo	Cronbach's Alpha	Standardized factor loadings
Information Quality (IQ)	0.894	0.75-0.79
Information Quantity (IQn)	0.902	0.72-0.88
Information Credibility (IC)	0.899	0.84-0.86
Information Adoption (IA)	0.897	0.69-0.84
Trust (TR)	0.908	0.77-0.83
Perceived Price (PRC)	0.885	0.76-0.87
Purchase Intention (PI)	0.906	0.81-0.84

### Exploratory factor analysis (EFA)

All the factor loading indices are good after removing the observed variables IQ5; IQ6; IQn1; IQn2; IQn6. The observed variables of the scale are all properly loaded on that construct, and the loading coefficients of the variables are all greater than 0.5. The factor analysis showed that the coefficient KMO = 0.976 met the requirements; the Significance level of Bartlett test = 0.000 (> 0.05); The total variance extracted is 66,403; the factor loading is greater than 0.5, so all indices are satisfactory. Thus, the remaining 31 observed variables were kept for the subsequent analysis steps.

**4.2. Confirmatory factor analysis (CFA) and structural model analysis**

The CFA results show that the research model fits the data ( $\chi^2/df = 2.095$ ; GFI = 0.922; AGFI = 0.905; CFI = 0.971; RMSEA = 0.041). Next, the study conducted tests of convergence validity, discriminant and reliability. The result of the first testing of convergent validity and discriminant validity was not satisfactory when MSV values of Trust construct, Information Quality construct, and Information Adoption construct were greater than their AVE values. Therefore, observed variables with the lowest standardized factor loadings were removed to make sure that the values of AVE were higher than those of MSV, and the square root of the AVE for each construct was larger than its estimated correlation coefficients with other constructs. After removing observations TR1, TR3, IA1, IQ6, IA1, IA2, IC1 from the original CFA model, the CFA model still ensures a good fit with:  $\chi^2/df = 1.746$ , GFI = 0.948, AGFI = 0.934, TLI = 0.981, CFI = 0.984 and RMSEA = 0.034, the AVE and MSV values satisfy the requirements and the correlation coefficients between observations are all less than or equal to 0.8 (both satisfy the requirements). The standardized factor loadings of all constructs ranged from 0.69-0.88 (Table 2). The results of testing convergence and reliability are presented in Table 3, showing that CRs are from 0.855 to 0.919, and AVEs are from 0.605 to 0.717. The value of AVEs was greater than MSVs. Therefore, it can be confirmed that the scales in the research model have both convergent and discriminant values to continue testing the hypotheses.

**Table 3: Convergent Validity and Discriminant Validity**

	CR	AVE	MSV	ASV	IQn	TR	PI	IQ	IA	PRC	IC
IQn	0.863	0.679	0.637	0.515	0.824						
TR	0.877	0.641	0.632	0.533	0.689	0.801					
PI	0.919	0.695	0.610	0.528	0.674	0.754	0.834				
IQ	0.860	0.605	0.584	0.519	0.744	0.708	0.647	0.778			
IA	0.855	0.663	0.637	0.576	0.798	0.722	0.743	0.747	0.814		
PRC	0.878	0.643	0.610	0.529	0.671	0.709	0.781	0.706	0.776	0.802	
IC	0.884	0.717	0.632	0.566	0.720	0.795	0.752	0.764	0.767	0.713	0.847

**4.3. Hypotheses testing**

The results of running SEM for the formal research model to evaluate the influence of factors on the purchase intention on social networking apps of Gen Z emphasize that indicators:  $\chi^2/df = 1.908$ ; GFI = 0.942; AGFI = 0.927; TLI = 0.977; CFI = 0.980; and RMSEA = 0.037 satisfy the requirement. Thus, the model is considered suitable for conducting hypothesis evaluation. Specifically, the results of the paths analysis presented in Figure 2 and Table 4 show that all paths have a statistically significant relationship.

Among the constructs, Information quantity has the strongest impact on consumers' Information adoption ( $\beta = 0.436$ , p-value < 0.001), followed by Information credibility ( $\beta = 0.338$ , p-value) < 0.001) and information quality ( $\beta = 0.173$ , p value < 0.001). Therefore, hypothesis H1, H2, H3 are accepted. The research results also confirm that perceived price is the most important factor in purchasing intention ( $\beta = 0.388$ , p-value < 0.001). Next, the factor of trust and receiving the information has a positive effect on purchase intention with standardized  $\beta$  values of 0.327 (p < 0.001) and 0.227 (p < 0.05), respectively. Thus, hypothesis H4, H5, H6 is also accepted.

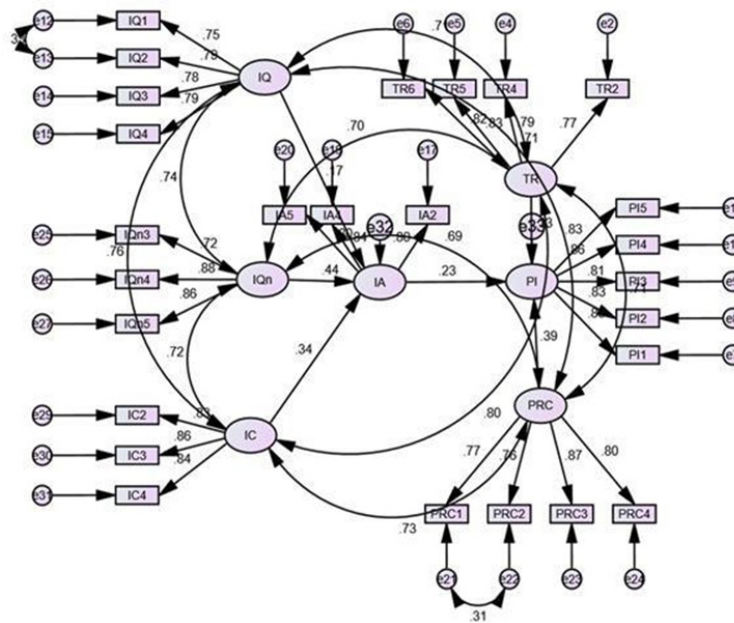


Figure 2: Standardized paths analysis

Table 4: Hypotheses testing

Hypotheses	Relationship			B	S.E	t-Value	p-Value	Hypotheses testing
H1	Information quality	→	Information adoption	0.173	0.060	2.878	**	Accepted
H2	Information quantity	→	Information adoption	0.436	0.054	7.806	***	Accepted
H3	Information credibility	→	Information adoption	0.338	0.052	6.707	***	Accepted
H4	Information adoption	→	Purchase intention	0.227	0.053	4.879	***	Accepted
H5	Trust	→	Purchase intention	0.327	0.057	6.513	***	Accepted
H6	Perceived price	→	Purchase intention	0.388	0.053	7.943	***	Accepted

Note: \*\*\*  $p < 0.001$ ; \*\*  $p < 0.05$

5. DISCUSSION

Research results contribute to clarifying the influence of factors such as information adoption (information quality, information quantity and information reliability), perceived price and trust on the purchase intention of Gen Z on social networking apps in Vietnam.

Research results have demonstrated that price is the factor that has the strongest influence on Gen Z’s purchase intention on social media ( $\beta = 0.388$ ). When all other constructs’ values are equal, one unit increase in price will boost Gen Z’s purchase intention to 0.388 units. This study’s results are consistent with Changan et al. (2021) and Tran Thach et al. (2021).

The research results also confirm that the trust factor positively impacts Gen Z’s purchase intention on social media with  $\beta$  value of 0.327. When all other constructs’ values are equal, one unit increase in trust

will boost Gen Z's purchase intention to 0.327 units. The findings adhere to previous studies by Changan et al. (2021) and Hsu et al. (2013). Surprisingly, in the context of Vietnam, the results support the previous findings of Ngo et al. (2022) and Tran Thach et al. (2021) to confirm that trust plays an important role in promoting Gen Z consumers' purchase intention via social networking apps, e.g., TikTok.

According to the research results, Information adoption also positively impacts the purchase intention on social media of Gen Z ( $\beta = 0.227$ ). When other factors are held constant if information adoption increases by one unit, Gen Z's purchase intention will increase to 0.227 units. This result is consistent with previous research results of Erkan & Evans (2016), Abedi et al. (2019), and Tran Thach et al. (2021).

Information quantity has the strongest influence on Information adoption ( $\beta = 0.436$ ). Information credibility and quality also positively affect information reception with  $\beta$  of 0.338 and 0.173, respectively. When information quality, quantity, and credibility are enhanced, consumers will quickly absorb the Information, leading to purchase intention. When other factors are constant, the quantity of Information, the trust of the Information and the quality of information increase by 1 unit, which will promote the consumer's information reception to increase by 0.436, 0.338, and 0.173, respectively. This result is consistent with the results of previous studies (Yeap et al., 2014; Park et al., 2007; Leong et al., 2022)

## 6. IMPLICATIONS AND SUGGESTIONS

According to the research results, perceived price is the most important factor affecting the purchase intention on social networking apps of Gen Z. Hence, enterprises/ sellers on social networking apps need to adjust price policies to match the value of the product/service. The price is not necessarily cheap but competitive with other competitors in e-commerce platforms. Creating discount codes to satisfy young consumers' psychology will help businesses/sellers increase the number of orders and sales of inventory products. Flash sale programs also stimulate consumer buying behaviour in a certain period.

Trust is found to have positive influences the purchase intention of Gen Z on social networking apps. When consumers have confidence in products and services as well as satisfy with information secure and after-sales service, their purchase intention will be likely improved. Thereby, enterprises should pay attention to the recruitment and training of staff with expertise and attitudes that cause consumer sympathy. Strengthening the support team and speeding up the process of resolving queries and complaints to increase consumer confidence are crucial. Enterprises should also set up consulting services to impart knowledge to consumers so that they better understand the potential and uses of the products. In addition, businesses/sellers need to prioritize the security of customer information. Enterprises should build an effective customer information security system by continuously upgrading software, using multiple layers of security, building a secure internal network, and regularly checking for security errors.

Information adoption has significantly positive influences on the purchase intention of Gen Z. There are more and more products and services displayed in social networking apps, which leads to consumers' increasingly consciousness to seek information before making purchase decision. Hence, improving information quality, information quantity, and information credibility is vital.

Firstly, enterprises/ sellers should create trending, unique and funny content on videos regularly; images in videos are clear, and posted products need clear images and descriptions to get more feedback quality. In addition, sellers can attach cards to thank consumers in the packages sent to the customer. Moreover, businesses should display the number of reviews and how good they are and sort them by the quality and star rating from high to low. The total number of reviews and star ratings will make it easier for consumers to receive product information and increase their purchase intention.



Secondly, enterprises/ sellers should describe their products with outstanding features; businesses need to list them along with specific evidence and evidence to prove it. This contributes to creating trust for customers with shared product/store information. In addition, businesses need to select and bring in necessary, relevant and highly persuasive information to convey to consumers most effectively. At the same time, businesses/sellers can upload close-up photos/videos of their products on social networking applications to prove the information they share. Once the information shared is reliable, it will increase the level of information receptivity of consumers.

Finally, enterprises/ sellers need to improve the quality of information by describing product information clearly and objectively to make it easy for consumers to understand. The basic information about the product needs to be described, such as product name, category, brand, function, etc. In particular, it is necessary to focus on highlighting the product's benefits because customers are usually most interested in the use of the product. The entire product information description will help customers understand what the product is, how it is used, and how to use it, making it easier to make a purchase decision.

## 7. SOME LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

Firstly, the study has just been conducted for Gen Z respondents in Vietnam. Therefore, further studies should expand the scope of research on customer groups of different ages or cultures.

Secondly, in terms of research methods, the research team only used qualitative and quantitative research methods (SEM model). Further studies can use other methods such as observation and experiment, to compare and have a more specific and general view of Gen Z's purchase intention on social media apps.

Finally, although the factors in the research model are the main factors in the IAM model that affect Gen Z's purchase intention on social media apps, future studies should add other factors such as product variety, interests, subjective standards, and reference groups.

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## ANALYSIS OF FACTORS AFFECTING THE INFORMATION TECHNOLOGY SKILLS OF STUDENTS SPECIALIZING IN ACCOUNTING-AUDITING MAJORS RESPONSE TO THE INDUSTRIAL REVOLUTION 4.0

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**ABSTRACT:** *The objective of this study is to find out the current situation and causes of the application of IT skills by students majoring in accounting-auditing at the Economics Universities in Hanoi responding to the industrial revolution 4.0 from which to propose solutions to improve students' IT skills. Through a survey of 200 students majoring in accounting - auditing at the Economics Universities in Hanoi, the research team has shown the influence of the factors about awareness, knowledge and practice, education program, and advances in science and technology. This is also the basis for the research team to propose some recommendations for helping students majoring in accounting - auditing to improve and enhance IT skills to create convenient and open learning environment for future job opportunities.*

**Keywords:** *Information technology, information technology skills, industrial revolution 4.0.*

### 1. INTRODUCTION

As we all know, the 4th industrial revolution (Industry 4.0) has brought many great applications to all areas of society. It also brings positive influences and valuable values in areas such as the economy, society, and culture of countries in general and Vietnam in particular. Therefore, it can be seen that mastering IT skills will help improve work efficiency, reduce costs, and increase global cooperation, thereby gaining competitive advantages (Mamahani, 2006). It can be said that IT skills are not only important for working people, but for students, this is one of the necessary skills. Because when students graduate, IT skills are a useful tool to support work and one of the factors that employers consider when choosing.

Experiencing the complicated breakout of the covid epidemic, affecting the whole world in all aspects: life, economy, and society...large enterprises and organizations have faced challenges and they cannot work directly, instead working online is a reasonable and effective choice. It can be said that the IT skills are becoming more and more necessary. Training and educational institutions at that time also had to deploy online learning to maintain and disseminate knowledge. Piccoli et al, (2001) conclude that *"This further confirms that IT skills have had a significant influence on teaching and learning effectiveness"*.

Currently, students' IT skills are still facing many limitations. Specifically, employers only rate the proficiency of accounting and auditing staff's computer literacy at an average of 5.35/7 (Binh, 2019). In addition, students majoring in accounting-auditing at economics universities in Hanoi rated this skill proficiency as 3.78/5 (Binh, 2017). There can be different reasons such as students not having the right awareness and not having proficient IT skills training, training programs, or the constant change of time in the industrial revolution 4.0. More specifically today, there are more and more appearances of modern technologies, machines, and equipment, as well as software with practical applications in other professions and specialized in accounting - auditing majors.

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From the issues mentioned above, studying the factors affecting normal skills, it is also necessary to cultivate more skills in using software, programming, etc.... not only suitable for students in accounting - auditing majors but also helpful in other majors, meaningful in both theory and practice for students. This study will focus on understanding the factors affecting the IT skills of students. The main object of the research is accounting-audit students at economics universities in Hanoi. The research results are the basis for proposing some recommendations to help students understand the impact of factors on their IT skills and improve their proficiency.

## 2. LITERATURE REVIEW

Information technology (IT) is a branch of engineering that uses computers and computer software to convert, store, protect, process, transmit, and collect information, there are great achievements of the current scientific and technological revolution (Nguyen Thi Yen, 2016). From another point of view, according to the decision of the Government in our country in the 1990s: *“IT is a collection of scientific methods, modern technical, means, and tools - mainly techniques, computer technology, and telecommunication order to organize, exploit and effectively use information resources which are rich and potential in all fields of human and social activities”*. In short, IT is a technical discipline that includes modern scientific and technological methods set on computers and computer software to distribute and process data and exchange information. Moreover, exchanging and storing data in many different forms adapt to the demands of people today so this is the bridge between people and modern technology.

Information Technology Skills are the ability to use computers and computer software to convert, store, protect, process, transmit and collect information (Phan Ngoc, 2021). This skill can be described as follows: Proper use of ICT (information technology) equipment to perform specific tasks; identifying the components of the basic ICT system; being able to use learning support software in different organizing, and at the device and on the network. In general, IT skills are the skills to use or perform proficiently one or a series of office computer applications; learning tools; remote meeting software (zoom, google meet, trans,...); software for storing and processing data (cloud, debased on basis of knowledge (knowledge or experience).

Information technology skills have been studied for many years in both the world and Vietnam by such as Picoli et al., (2001); Medlin, Dave, & Vannoy (2001); Caruso and Salaway (2007); K. Lee and Mirchandani (2010); Salini Rosaline & J. Reeves Wesley (2017); Acemoglu and Restrepo (2017); MS c, NCS. Vu Thi Thanh Binh (2018); L.T.T.Thuy (2019); L.T. Han (2019); Dr. Vu Thi Thanh Binh (2019); Dr. Vu Thi Thanh Binh, Dr. Tran Thi Nga (2021);... These studies all refer to the factors affecting students' information technology skills with 5 main factors: Awareness, knowledge and practice, program training, and advancement in science and technology.

### \* *Awareness:*

The ever-changing business and technology environment requires professional IT skills (Medlin, Dave, & Vannoy, 2001). Advances in science and technology are dramatically changing and shaping the world where university students are the subject of research (Caruso and Salaway, 2007). In addition, the development of Internet technology significantly impacts student learning in IT skills training in universities (Picoli et al., 2001).

Regarding the importance of IT skills, K. Lee and Mirchandani (2010) used a questionnaire to survey 70 IS managers representing 21 companies in the Midwest United States. The study shows the growing importance of IT skills and aims to suggest essential IT skills preparation for current and future information systems professionals and educators.

*H1: Elements of awareness of IT skills*

**\*Knowledge and practicing:**

A study by Galanek et al. (2018) examined data on 64,536 students from 130 institutions in 9 countries and 36 US states. Research results show that all students have access to technology that promotes student success. The use of the e-learning system is popular in educational institutions and student satisfaction, most students express their love for the e-learning environment, and students spend 1- 4 hours of online learning per day.

From there, the study makes several recommendations such as providing students with basic technology, ending the ban on Internet use in the classroom, and improving the quality and coverage of wifi on campus. At the same time, it helps to increase students' interest in using IT, and continuing education enhance insight into tools and improves IT problem-solving skills. It can be seen that learning and practicing the IT environment helps to improve students' IT skills and raise the level of satisfaction with the learning environment.

*H2: Elements of knowledge and practice of IT skills*

**\*Education programs:**

In the learning environment, Piccoli et al. (2001) Preliminary study and evaluation of the effectiveness of basic IT skills training in demonstrating the effectiveness of virtual learning environments (VLEs). Research results show that there is no significant difference in the learning outcomes of students in the traditional environment and the VLE learning environment. The results of these studies also have important contributions to the current implementation of IT in online learning.

Caruso and Salaway (2007) collected data online to improve academic performance and enhance students' IT skills; based on qualitative data analysis, in-depth interviews with 50 groups of students; Based on data collected through a survey of 4,752 students obtained from 65 organizations based on longitudinal analysis. Research by Caruso and Salaway (2007) shows the use of IT skills and experiences of university students in courses. At the same time, the study also pointed out the importance of teaching staff in IT education; awareness of the use of IT in courses; and the impact of IT on student learning outcomes in courses.

*H3: Elements of the training program for IT skills*

**\*Advances in science and technology:**

According to previous studies by ACCA (2019), Audit and Technology, it is highly estimated that globally there will be about 400 million jobs displaced (MGI 2017). However, history should not ignore the lesson that the introduction of new technology will eventually create new jobs (Acemoglu and Restrepo, 2018).

As technology is conceptualized as replacing human labor in tasks that used to do even jobs reserved for more educated people (Acemoglu and Restrepo, 2018). Strong, proactive worker training and retraining efforts, and immediate action, are essential for problem-solving, as well as consideration of policy issues related to current work arrangements and non-standard future (ILO, 2019; Karacay, 2018). The impact of technology on jobs and workers is varied and complex, requiring workers to be up-to-date with new IT skills or else they will gradually become obsolete and then automatically become obsolete. expulsion. Technology was born to increase worker productivity (Acemoglu and Restrepo 2017). Thereby, with the advent and rapid change of new software or applications today, employees must have professional IT skills as well as adaptability to be able to meet the needs of customers.

*H4: Elements of scientific and technological progress of IT skills*

### 3. RESEARCH METHODS

The survey subjects of this study are full-time students majoring in accounting - auditing from economics universities in Hanoi: Thuring Mai University, Academy of Finance, Banking Academy, National Economics University,...is conducted through survey questionnaires. The questionnaire includes Likert-type items (from 1 = “strongly disagree” to 5 = “strongly agree”) to measure 4 independent variables and the dependent variable – IT skills.

According to Hair et al 2006 (Tran Van Quy & Cao Hao Thi, 2009), the general rule for the minimum sample size in EFA exploratory factor analysis is 5 times the number of observed variables and the number of samples suitable for the analysis. Multivariate regression is also 5 times the number of observed variables. The group has given 15 observed variables for 4 independent variables, so the minimum sample size will be 75. However, it is also suggested that the minimum number of samples is 10 times (x) the number of variables. The sample size in this study is  $n = 200$ , which meets the standard for the research model. The study used a random sampling method to select the sample.

To test the scale model and assess its relevance of the model, as well as analyze the influence of factors on the IT skills of accounting-auditing students at economics universities, the study used exploratory factor analysis (EFA) and regression analysis.

### 4. RESEARCH RESULTS

#### 4.1. Demographic characteristics

The research team conducted a survey of 200 accounting and auditing students at universities in the economy in Hanoi. The survey results show that 60% of survey respondents are female and 40% are male. Besides, the results that the authors have collected after the investigation show that the students mainly come from Thuring Mai University (36%), followed by schools such as the Banking Academy, the National Economics University National, the Academy of Finance, and the Economics University - VNU. At the same time, the author group also got 13% of the votes, which came from other universities in the field of economic training such as Industry Hanoi University, and Foreign Trade University,...This shows that the distribution of survey questionnaires at universities of economics in Hanoi city is quite wide and even. Thereby, the statistics table also aims to show the certain interest and importance of IT skills for students of other majors in general, and majoring in accounting and auditing in particular.

#### 4.2. Regression analysis

*Firstly*, the study analyzes the reliability of the scales in the model by Cronbach’s alpha coefficient. The values of other variables in the scale have high reliability with the total variable correlation coefficient  $> 0.3$  and Cronbach’s Alpha coefficient  $> 0.6$ .

*Then*, the research team carried out exploratory factor analysis EFA to evaluate the value of the scale by the KMO coefficient Bartlett’s test. The scale is accepted when  $0.5 \leq KMO \leq 1$ ; Sig coefficient. = 0.000 of Bartlett’s test indicates that the observed variables are statistically significant; The total variance extracted is  $\geq 50\%$  and the factor loading factor  $\geq 0.5$  proves that the scale value is suitable for factor analysis.

#### *For the independent variable*

Performing the first analysis shows that the KMO coefficient is  $0.5 \leq 0.798 \leq 1.0$ , demonstrating the appropriateness of the EFA model; The Bartlett test is significant for Sig. = 0.000. Then, analyzing the extracted variance of the factors showed that the total extracted variance of the factors was  $64.653\% > 50\%$  met the standard. However, when performing rotation, there is 1 variable: TP1 uploads in both factors, so

this variable is removed and the second analysis is performed.

**Table 1. KMO and Bartlett’s test results (2nd time)**

Kaiser -Meyer -Olkin Measure of Sampling Adequacy		.819
Bartlett’s Test of Sphericity	Approx Chi-Square	Chi-Square
	df	91
	Sig.	.000

Source: Summary of survey results

The test results after removing the variable with the KMO coefficient of  $0.5 \leq 0.819 \leq 1.0$ , demonstrate the suitability of the EFA model; The Bartlett test is significant for Sig. = 0.000 indicates that the observed variables are correlated with the total number of observations.

Then, perform data has been extracted by factors. Table 2 shows that the total variance extracted for the factors is  $63.555\% > 50\%$  meets the standard, that is, 63.555% of the variation of the data is explained by 4 factors.

**Table 2. Rotation matrix results (2nd time)**

	Component			
	1	2	3	4
PK2	.854			
PK4	.806			
PK3	.697			
PK1	.645			
C4		.808		
C1		.737		
C2		.725		
C3		.660		
TP4			.824	
TP3			.740	
TP2			.701	
ST1				.795
ST3				.760
ST2				.728

Source: Summary of survey results

For the dependent variable:

KMO and Bartlett’s scale (Kaiser-Meyer-Olkin) with the value = 0.785 satisfy the condition in the range from 0.5 to 1; Bartlett’s test result has the value Sig = 0.000. Factor analysis fits real data.

The total variance extracted from factors is 60.196%, which means a 60.196% possibility that the factors are explained by the observed variables. The results of the rotation matrix show that there is a factor extracted from the observed variables included in the EFA analysis.

After testing reliability and analyzing EFA, the research team used Pearson’s correlation coefficient to test the correlation between the dependent variable and the independent variable. The results show the Sig value. between each independent variable and the dependent variable is less than 0.05, so it does not



remove any kind of factors. In other words, all the independent variables have a linear relationship with the dependent variable.

To examine the impact of independent variables on the dependent variable, multivariate regression was performed. The results in Table 3 show that R Square = 0.552, F-test (ANOVA) = 0.000; therefore, the regression model is suitable, as about 55.2% of the variation of the dependent variable is explained by the independent variables in the model.

**Table 3. Results of ANOVA analysis**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.743 <sup>a</sup>	.552	.543	1.44105	2.287

ANOVA<sup>a</sup>

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	499.140	4	124.785	60.091	.000
	Residual	404.940	195	2.077		
	Total	904.080	199			

Source: Summary of survey results

Table 4 presents the results of multivariate regression as follows: The independent variables all have an impact on the dependent variable because the Sig value is less than 0.05 in which the science and technology variable has the strongest impact and the (C) variable has the worst move. The VIF coefficients of the independent variables are all less than 2, so there is no multivariable nearly.

**Table 4. Multivariable regression model results**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.038	.793		4.066	.011		
	C	.086	.043	.113	6.718	.046	.732	1.366
	PK	.270	.043	.356	5.337	.000	.710	1.409
	TP	.192	.051	.200	2.718	.007	.801	1.248
	ST	.374	.053	.361	2.115	.036	.875	1.143

Source: Summary of survey results

The authors give conclusions in order of the impact of the independent variables on the dependent variable of IT skills as follows:

- (i) All four hypotheses are accepted
- (ii) Regression model (standardized coefficients) is determined as follows:

$$SAT = 0,361*ST + 0,356*PK + 0,200*T + 0,113*C$$

This is completely consistent with the reality of today's students, when the progress in science and technology is increasing, students need to change quickly to catch up with the general trend and adapt to the changes. At the same time, knowing and practicing skills also helps students gain a deeper understanding of IT, find out how to handle it quickly, and create efficiency. In addition, good facilities also facilitate the development of IT skills for students and students need to have the right awareness to gain new perspectives on how important and necessary IT skills are, help me bring many benefits in study and work.

Besides, students majoring in accounting - auditing are trained by many reputable universities, providing a lot of important knowledge to IT skills to help students gain a large amount of understanding. The

different teaching of the lecturer also brings about diversity in the student's understanding and perception of IT. However, students also need to hone their IT skills outside such as in supplementary IT skills classes or the working environment, and improve their sense of self-study and teamwork so that students' IT skills can be improved significantly and quickly.

## 5. CONCLUSION AND RECOMMENDATIONS

From the results of the research model regression, it is shown that it is necessary to have solutions to stimulate students' understanding and adaptation to the continuous change in technology to help students become proficient in IT skills. Therefore, the group has proposed some solutions to improve the proficient use of IT skills of students majoring in accounting - auditing to create open opportunities and improve understanding of Industrial Revolution 4.0 for students as follows:

*Firstly*, students need to try harder to learn new knowledge and always update new applications and software because the specificity of IT is always changing very quickly. The knowledge about changes in hardware systems and software applications should also be disseminated regularly to students right from the time they are in school. At the same time, students also need to adapt and absorb new advances quickly to be able to keep up with the daily and hourly changes in science and technology.

*Secondly*, students need to actively enroll in and play a key role in IT courses on and off campus. In addition, students need to maintain spending time practicing their existing skills and increase the frequency of practicing new IT skills through available applications, software, or Web sites. Besides, students can also create study groups with friends or lecturers to share the IT skills needed during their studies or can serve for work in the classroom in the future.

*Thirdly*, leaders of training institutions need to innovate and organize seminars on Industry 4.0 for lecturers and students of the university to raise awareness about the importance of IT application. At the same time, universities specializing in accounting and auditing need to equip students with IT skills when building training plans such as Excel, PowerPoint, Google Docs, or accounting software as well as other software. Training institutions specializing in accounting and auditing should also add training programs related to IT skills used in majors such as Blockchain, and cloud so that students can have faster and clearer access to them, creating opportunities for students to understand and apply flexibly in the future working environment.

*Fourth*, students need to be proficient in computer applications; support online, and distance learning; tools to exchange and store data (cloud, drive, ...) so that we can understand and realize the important value of IT skills. Students also need to learn and gradually approach new applications and technologies related to their major.

However, the research results still have some limitations as follows: limited scope, subjects, and time to conduct the study, the new study was conducted on students majoring in accounting - auditing at economics universities in Hanoi but has not done it with students with a broader scope and scale. Therefore, in the future, the authors wish to expand the survey object and scope to have more accurate analytical results and give more practical recommendations to improve the survey results.

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## THE ROLE OF ATTITUDE IN EXPLAINING VIETNAMESE CONSUMERS' INTENTION TO ADOPT MOBILE MONEY

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**ABSTRACT:** *The study was conducted to determine the role of attitudes in explaining vietnamese consumers' intention to adopt mobile money, thereby recommending some solutions to improve the effectiveness of this activity. This paper extends the original Technology Acceptance Model (TAM)(Davis et al., 1989), by integrating self-efficacy (SE), technology anxiety (TA). The research model is assessed with survey data of 307 consumers living and working in Vietnam with a partial least squares structural model (PLS-SEM) using SMART PLS 3.0 software. The result indicated that Vietnamese consumers' intention to use mobile money is influenced by Perceived ease of use and Perceived usefulness through Attitudes towards mobile money. Some solutions were recommended: (1) Limiting the scope of operations, (2) Upgrading and investing in infrastructure, and telecommunications network systems, (3) promoting communication about the features and benefits of mobile money. The article also suggested some future research directions, including the need to expand the scope of the research, to expand the sample size, to expand the business customers, and to add other factors such as the influence of the social environment, association, and confidentiality... to supplement and complete the model.*

### 1. INTRODUCTION

Along with the development of mobile commerce, mobile payment is becoming an inevitable trend in the world and in Vietnam. Those are payment services operated under financial regulation and made from or through a mobile device. Instead of paying with cash, checks or credit cards, consumers can use mobile phones to pay for services and goods (Felix Hoffler et al., 2019). Aware of the role and importance of non-cash payments, the Prime Minister issued Decision No. 1813/QD-TT in 2021, approving the project of developing non-cash payments in the period of 2021 - 2025 in Vietnam.

However, the speed of mobile payment development in Vietnam is not commensurate with the potential. According to the Statista Digital Market Prospects Report 2021, although about 73% of the Vietnamese population has a mobile network connection, only about 29% of the population uses mobile phones and the average spending of each Vietnamese customer is limited, the mobile market is still very modest, about 74 USD in 2021. The reason is that people's habit of using and paying in cash is still quite popular. In addition, low-income users often live far away from central areas, and the cost of accessing financial services is quite high, reducing access opportunities. In order to bring financial services to remote areas, mobile money services have been piloted since March 9, 2021, with Decision No. 316/QD-TTg of the Prime Minister on approval. pilot implementation of using telecommunications accounts to pay for goods and services of small value (Decision No. 316/QD-TTg). According to statistics from the Ministry of Information and Communications, Vietnam has more than 3.9 million mobile money users by 30 April. The number of people using mobile money in Vietnam increased triply compared to the figure in April 2022. The number of users in rural, mountainous, and remote areas reached more than 2.7 million, accounting for 69% of the total service users. Lately, there are 9,953 mobile money service points nationwide, an increase of 12% compared to March 2023. The number of units accepting payment via Mobile Money was 15,326, up 0.2%.

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The total number of transactions using mobile money was more than 26.1 million, with a total transaction value of over 1,683 billion VND. On 19 May 2023, the Ministry of Information and Communications issued the official dispatch No. 1865/BTTTT-CVT which proposes to continue piloting mobile money service from 18 November 2023 until 31 December 2025.

However, with the great potential of the Vietnamese market, the number of users is still low, which has not yet ensured the Government's goal of bringing financial services to remote areas. This is an urgent fact that is being concerned by businesses providing mobile money services as well as the Government. At the same time, it is a scientifically meaningful and topical dilemma when there is very little research on the relationship between customers' attitudes and behavior of Vietnamese consumers accepting the use of mobile money.

With the above statements, it can be seen that mobile money services are still very new to consumers in Vietnam. The purpose of this research was to investigate the role of attitudes in explaining vietnamese consumers' intention to adopt mobile money. The rest structures include as follows. The second section presented a theoretical basis, while the third discussed the model, hypothesis and research scales on the role of attitudes towards the intention to use mobile money. The fourth section presented methodology employed. The fifth section has findings and discussion, and the last is the conclusion.

## **2. THEORETICAL BASIS**

### **2.1. Theoretical basis about mobile money**

#### **2.1.1. Definition of mobile money**

According to Aker and Mbiti (2010), Jack and Suri (2011), Donovan (2012): Mobile money is a provision of financial services through a mobile device, it encompasses a range of services, it offers banking services, peer-to-peer (P2P) transfers, insurance products. It can be used in "different ways which include sending text messages to transfer value or retrieving bank account details via the mobile phone are available that allow phones to transfer money to other contactless cash registers" (Donovan, 2012). That is, the provision of financial services without a physical presence of a financial institution but an enabled means of carrying out financial transaction business through mobile phones and other handheld mobile devices (Aker and Mbiti, 2010).

In 2017, World Bank defined: At the most basic level, mobile money as the provision of financial services through a mobile device. This broad definition encompasses a range of services, including payments (such as peer-to-peer transfers), finance (such as insurance products), and banking (such as account balance inquiries).

According to Morawczynski (2009), mobile money transfer services accelerate money transfers when money is converted into electronic form instead of physical form. To transfer money, mobile phone users register with a mobile money transfer agent and then deposit cash (Bisht and Mishra, 2016). This cash is displayed as cryptocurrency in the e-wallet on the sender's SIM card (Morawczynski, 2009). Cryptocurrency can be sent to the recipient's phone. Recipients can convert crypto balances into cash upon arrival at the dealer (Morawczynski, 2009).

In this study, the research team chooses: Mobile money is a payment method that does not require users to own/link to a bank account and this payment account is attached to the owner's SIM card.

#### **2.1.2. Characteristics of mobile money**

According to Sunduzwayo Madise (2019) mobile money has characteristics such as:

Firstly, Utility and Value: No bank account is required: With mobile money, users can recharge their bank accounts directly through transaction points. The parties involved in the transaction, even though using

telecommunications services of different carriers, can still perform money transfer/receipt transactions with each other;

No need to use a smartphone/3G/4G: With mobile money, old phones with basic functions can still be used to pay and transfer money via mobile. In fact, mobile money has a special feature because money is in the account, mobile money is attached to the SIM and differentiated from the telecommunication account;

Money transfer, receive money, pay anytime, anywhere via mobile wave: Due to the advantages attached to the SIM, mobile money users can still easily transact via SMS.

Second, about the unit of Account: Mobile money has a one-to-one ratio with cash deposited in an account domiciled at a commercial bank. This ensures that it serves as a unit of account.

According to Sunduzwayo Madise (2019) mobile money has six characteristics which are:

*Utility and value:* The greater the number of those accepting payments using mobile money, the more mobile money is similar to cash. Mobile money digitally represents itself as a store of value. A person can transfer the value to another one, peer to peer, and the person who receives such transferred value is free to deal with it in any manner. The storage of value indicates that mobile money is a representation of cash.

*Unit of account:* Mobile money has a one-to-one ratio with cash deposited in an account at a commercial bank. The mobile money provider opens a pool account with a bank where cash from mobile money users is deposited. The provider then issues out mobile money based on these deposits. Mobile money users exchange cash for mobile money and vice versa. In other words, mobile money users are not required to have a bank account. Mobile money, therefore, retains the same properties of a unit of account as cash does.

*Portability:* The ubiquitous nature of the mobile phone has meant that mobile money can also be carried virtually anywhere, and in a cost-effective manner too. Compared to cash, mobile money is safer to carry around. Additionally, an internet connection and a smartphone are not necessary to make transactions using mobile money. In this case, mobile money is not only portable but also convenient.

*Consistency:* As it has a one-to-one ratio with cash, mobile money is consistent. It maintains the same value across time and space. When used within its ecosystem, mobile money does not lose its value when it moves around. Any loss of value occurs mostly at the point of transition between cash and mobile money, usually at the point of cashing out. A transaction fee is levied on the service.

*Recognition:* Within its ecosystem, mobile money is easily recognized and accepted. It is credited after a transaction has been completed and someone has been paid. In the same way, with cash, once it is presented, it is recognizable, even before the vendor puts it into the cash box.

*Legal tender:* Madise (2019) indicated that mobile money was social tender and definitely not fiat money. However, we found the opposite evidence. According to GSMA (2010) and Decree: Regulations on non-cash payments (2019), electronic money is stored value held in the accounts of users, agents, and the provider of the mobile money service. Therefore, mobile money can be defined as a form of electronic money that is legal tender according to the Governor of the State Bank of Viet Nam. As a consequence, mobile money basically is fiat money.

### **2.1.3. Benefits and drawbacks of mobile money**

#### **\* Benefits of mobile money**

According to the World Bank, accessing to financial services as a ‘critical step’ towards reducing poverty and inequality. Furthermore, a lot of scholars such as Muto and Yamano (2009); Aker and Mbiti (2010); Wesolowski et al. (2012) also content that access to financial services is crucial for development.

However, majority of the population in developing countries have been excluded from access to financial services because of the high cost associated with delivering the services, especially in the rural areas.

For the macroeconomy, mobile money promotes financial inclusion (Donovan, 2012), promotes economic growth (Beck et al., 2018) and has a significant impact on other macro outcomes such as interest rate and inflation (Mawejje, 2019; Aron et al., 2015).

For the micro-economy, mobile money facilitates the safe storage and transfer of money, makes it easy for people to pay for goods and services, and facilitates trade (Jack and Suri, 2007). Many researchers also point out that mobile money brings convenience and flexibility to money users because they can transact anytime, anywhere [Bank of Uganda Annual Report 2015/2016, Bisht and associates (2016), Chauhan (2015)]. With that safe storage mechanism, mobile money can change saving habits, increase net savings and savings distribution of households (Aker et al., 2016); Consumption Smoothing, and activate risk-sharing networks to control negative shocks (Jack and Suri, 2014). Besides, the studies of Kikulwe et al. (2014), Jack and Suri (2014), Mbiti and Weil (2011), Aker et al. (2011), Johnson and Nino-Zarazua (2011) also revealed that mobile money usage can promote access to and use of financial services, especially among the rural population. Not only that, mobile money has improved people's welfare by positively impacting household income (Kikulwe et al., 2014). Remittances received contribute directly to income, thereby minimizing risk exposure and liquidity constraints (Kikulwe et al., 2014). This has promoted the commercialization of agriculture, rural development and poverty alleviation (Kikulwe et al., 2014).

Furthermore, Donovan (2012); Lochan et al. (2010) also contend that mobile money service helps in improving the productivity and efficiency of the unbanked microenterprise owners by avoiding the lengthy queue time, reducing transaction cost and leakage, and improving security (see also Aker and Wilson, 2013).

#### **\* Drawbacks of mobile money**

In addition to the above benefits, according to Tobin, 2011; Winn and Koker, 2013; Gutierrez and Tony, 2014; GSMA, 2018, mobile money still has many limitations. The first is a security issue: customer data can be compromised; the possibility of users losing personal information due to the use of mobile transactions; customer's money may be lost without a proper management plan; Transactions may fail or fail when a problem occurs in the transaction chain of the payment system. In terms of the amount of time it takes to execute a trade, there can be a lot of risk. At the same time, there are also many legal risks that mobile money fraud will increase if there is a lack of supervision in the mobile money space, especially when the supervision of state management agencies is not as tight as in other traditional financial sectors. Therefore, when an adverse event occurs, the consequences will be very serious.

Besides, according to Kasekende (2014), The largest potential risk facing mobile money is probably an operational risk and central banks are concerned about its potential disruptive impact on the payments system.

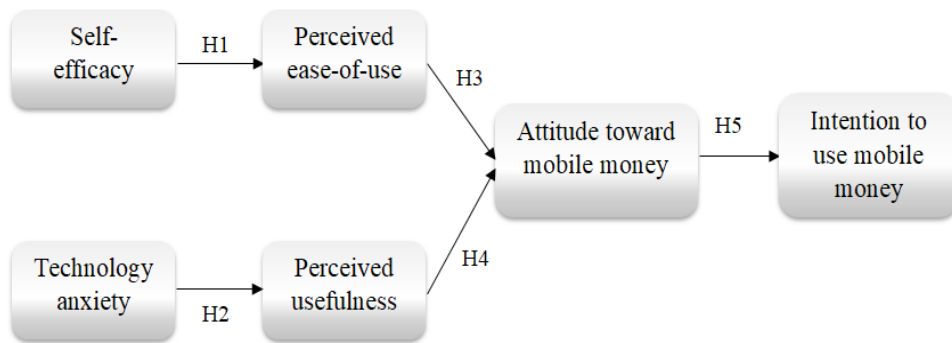
## **2.2. Theoretical basis about intention to use in technology**

Intentions are assumed to capture the motivational factors that influence a behavior; they are indications of how hard people are willing to try, of how much of an effort they are planning to exert, in order to perform the behavior (Ajzen, 1991). Davis (1985) states that intention to use is the degree to which someone has developed a plan to perform or not to perform some particular behavior in the future. Davis et al. (1989) later in a study suggested that intention to use is a person's willingness to accept the use of technology. Cheng et al. (2006) argue that the intention to use is used to refer to the consumer's intention to use.

Based on the definition of mobile money and many of the intention-to-use concepts listed above, the intention to use mobile money used in this study has one meaning: consumer willingness to use mobile money .

### 3. MODEL, HYPOTHESIS AND RESEARCH SCALES ON THE ROLE OF ATTITUDES TOWARDS THE INTENTION TO USE MOBILE MONEY OF VIETNAMESE CONSUMERS

The research team builds the model based on the studies of Davis et al. (1989), Fishbein & Ajzen (1975), Ajzen (1991), Precious Chikezie Ezeh & Nwu Kamaka Nwankwo (2018), Emmanuel Kofi Penney et al. (2021). In our model, we considered six constructs: self-efficacy, perceived ease-of-use, technology anxiety, perceived usefulness, attitude toward mobile money and intention to use mobile money. Figure 1 summarizes our proposed model and hypotheses.



**Figure 1: Research model**

*Source: Author's recommendation based on literature review*

The research hypotheses are formulated as follows:

#### \* Self-efficacy (SE)

Self-efficacy is considered to be a major factor in the intrinsic motivation of individual consumers (Davis et al., 1989) and was found to have an indirect influence on behavioral intention (Davis et al., 1989; Bandura, 1994).

In particular, self-efficacy has long been associated with ease of use seen in the literature on technology adoption (Pavlou and Fygenon, 2006; Polites and Karahanna, 2012). Several empirical studies support the effect of effectiveness on technology adoption behavior (Ellen et al., 1991). Consumers with high levels of self-efficacy are more motivated to perform a certain task than consumers with low levels of self-efficacy because they are more confident in achieving task-positive outcomes. (Noe and Wilk, 1993; Davis et al., 1989). In particular, consumers with high levels of technological self-efficacy were more engaged in the use of technology-based services (Dabholkar and Bagozzi, 2002).

Therefore, consumer self-efficacy can predict consumer adoption of mobile money. We thus hypothesize that:

*Hypothesis 1 (H1): Self-efficacy has a significant positive impact on the perceived ease-of-use.*

The scale for this hypothesis consists of four observed variables: SE 1 - I learn how to use mobile money on my smartphone easily; SE 2 - I could use mobile money if someone showed me how to do it; SE 3 - I could use mobile money if someone supports me when I am in trouble; SE 4 - I can complete a money transfer or pay a bill with mobile money if I have plenty of time.

#### \* Technology anxiety

Technology can evoke feelings of anxiety in consumers (Meuter et al., 2003), which can influence consumers' attitudes and behavior towards technology use. Similarly, Parasuraman (2000) suggests that these consumers' positive or negative feelings toward technology are closely related to their behavior.



Technological anxiety can cause consumer discomfort with technology itself (Liljander et al., 2006). Research by Meuter et al (2003) has shown that technology anxiety is an important indicator of consumers' intention to use technology-based services.

Gelbrich and Sattler (2014) find that anxiety about technology reduces mental acceptance of technology; Consumers feel nervous about using new technology for the first time, leading to a negative impact on intention to use. Similarly, anxiety about technology has a negative effect on the adoption and adoption of new forms of technology (Chen and Chang, 2013). Hence, we proposed the following hypotheses:

*Hypothesis 2 (H2): Technology anxiety has a negative impact on perceived usefulness.*

The scale for this hypothesis consists of four observed variables: TA 1 - Mobile money service makes me feel uncomfortable; TA 2 - I feel apprehensive about using new technology; TA 3 - I fear that I will do the wrong thing when I use new technology; TA 4 - I am worried about my data being compromised when using mobile money.

#### **\* Perceived ease-of-use**

Perceived ease of use is the extent to which an individual believes that a system would be easy to use and that the system should not be complex in order to encourage its adoption (Carter & Belanger, 2004; Rogers, 1995). This means to use a particular form of technology, users should need little effort (Liu & Li, 2010). This effort can be physical and mental (Davis, 1993; Taylor & Todd, 1995). Extensive researches have documented evidence of the significant effect of PEOU on user BIs (see Adam, Nelson, & Todd, 1992; Davis, 1989; Carter & Belanger, 2004; Guriting & Ndubisi, 2006; Ramayah, Jantan, & Aafaqi, 2003; Ramayah, Siron, Dahlan, & Mohamad, 2002). In the mobile money services, PEOU includes how easy the registration procedure is, ease of use of the payment method, easy access to customer services, minimal steps required to make a payment, availability of mobile money transfer agents and how accessible the service is on mobile phones with the basic features and software. With these easiness, the study hypothesized that:

*Hypothesis 3 (H3): Perceived ease-of-use has a positive impact on attitude toward mobile money.*

The scale for this hypothesis consists of four observed variables: PEOU 1 - Mobile money allows me to easily control over my financial transactions; PEOU 2 - Mobile money brings convenience to use; PEOU 3 - Steps to use mobile money are easy with me; PEOU 4 - Mobile money gives me more freedom of mobility.

#### **\* Perceived usefulness**

PU is defined as “the degree of users' assessment of whether employing a specific product or service can improve their job performance and efficiency” (Davis, 1989). In this research, PU refers to the degree of users' personal assessments of whether using mobile payment contactless technologies can improve their job performance and efficiency. It can be suggested that the higher the usefulness of mobile payment contactless technologies, the higher the users' satisfaction will be. The existing literature provided evidence that PU has a considerable impact on satisfaction (Daragmeh et al., 2021; Puriwat and Tripopsakul, 2021; Rahi et al., 2021). Furthermore, it can be suggested that the higher the usefulness of mobile payment technologies, the higher the users' sustained use will be. Prior studies also supported the fact that PU has a major impact on sustaining the use of mobile payment technologies (Daragmeh et al., 2021; Puriwat and Tripopsakul, 2021; Rahi et al., 2021). Hence the next hypothesis has been constructed:

*Hypothesis 4 (H4): Perceived usefulness has a positive impact on attitude toward mobile money.*

The scale for this hypothesis consists of five observed variables: PU 1 - In general, mobile money could be useful for me; PU 2 - I can use mobile money to make financial transactions by phone easily; PU

3 - The mobile money service system is a useful mode of payment; PU 4 - Mobile money saves me time doing transaction services; PU 5 - Mobile money saves me shopping time.

**\* Attitude toward mobile money**

According to the TRA developed by Fishbein and Ajzen (1975), the behavioral intention can be explained by the attitude toward behavior that is defined as individual positive and negative feelings about behaving in a particular way. Furthermore, in TAM proposed by Davis et al. (1989) behavioral intention can be explained by attitude toward a system. Lin (2011) found a significant and positive linkage from attitude to behavioral intention to explain the adoption or continued usage of mobile banking. Deb and David (2014) empirically established the positive influence of attitude on behavioral intention. Thus, the following hypotheses are formulated:

*Hypothesis (H5): Attitude toward mobile money has a positive impact on intention to use mobile money.*

The scale for this hypothesis consists of four observed variables: In sum, how would you classify your overall attitude towards using smartphones for m-money? AT 1 - Negative-Positive; AT 2 - Unfavourable-Favourable; AT 3 - Poor-Excellent; AT 4 - Unattractive-Attractive.

**\* Intention to use mobile money**

Intention to use is a familiar research topic in marketing. Intention to use can be found in research on the Theory of Intended Behavior (TPB) (Ajzen, 1991). Intention to use is considered the best predictor of the actual behavior of adoption and use of any new technology (Liébana-Cabanillas et al., 2015), (Venkatesh et al., 2003). Therefore, the intention to use mobile commerce is selected as a dependent variable when assessing the level of acceptance of using mobile commerce by consumers.

**\* Intermediate relationships**

In the recent study by Gbongli et al (2019), the authors tested the hypothesis of an indirect relationship through intermediate variables and most of them were accepted. The research plan from their study, the research team put forward the following hypotheses:

*Hypothesis (H6): Attitude towards mobile money is a mediating factor in the relationship between perceived ease of use and intention to use mobile money.*

*Hypothesis (H7): Attitude towards mobile money is a mediating factor in the relationship between perceived usefulness and intention to use mobile money.*

**Table 1. Conceptual framework of variables.**

Encode	Scale	Source
	Self-efficacy	
SE1	I learn how to use mobile money on my smartphone easily.	Venkatesh et al. (2003); Venkatesh et al. (2008)
SE2	I could use mobile money if someone showed me how to do it.	
SE3	I could use mobile money if someone supports me when I am in trouble.	
SE4	I can complete a money transfer or pay a bill with mobile money if I have plenty of time.	
	Technology anxiety	
TA1	Mobile money service makes me feel uncomfortable.	Park et al. (2019); Meuter et al. (2003)
TA2	I feel apprehensive about using new technology.	
TA3	I fear that I will do the wrong thing when I use new technology.	
TA4	I am worried about my data being compromised when using mobile money.	
	Perceived ease-of-use	

PEOU1	Mobile money allows me to easily control over my financial transactions.	Upadhyay et al. (2016); Venkatesh & Davis (2000); Davis et al.(1989)
PEOU2	Mobile money brings convenience to use.	
PEOU3	Steps to use mobile money are easy with me.	
PEOU4	Mobile money gives me more freedom of mobility.	
Perceived usefulness		
PU1	In general, the mobile money could be useful for me.	Davis et al. (1989); Daragmeh et al. (2021)
PU2	I can use mobile money to make financial transactions by phone easily.	
PU3	The mobile money service system is a useful mode of payment.	
PU4	Mobile money saves me time doing transaction services.	
PU5	Mobile money saves me shopping time.	
Attitude toward mobile money		
AT1	Negative-Positive	Fishbein and Ajzen (1975); Lin (2011); Deb & David (2014)
AT2	Unfavourable-Favourable	
AT3	Poor-Excellent	
AT4	Unattractive-Attractive	
Intention to use mobile money		
IU1	I intend to use/reuse mobile money in the short term/long term.	
IU2	When I have appropriate conditions (mobile device or financial ability or access to mobile money service providers...), I will use mobile money service.	
IU3	I will learn how to use mobile money better.	
IU4	I will make use of mobile money for my trading activities to the extent possible.	

(Source: Compiled and developed by the autor team)

## 4. RESEARCH METHODOLOGY

### 4.1. Data collection and Procedure

A purposive sampling technique was applied to select the various study areas, and simple random sampling was employed to sample the users of the service. Survey participants are consumers in 8 regions of Vietnam including Northeast, Northwest, Red River Delta, North Central, Central Highlands, South Central Coast, Southeast and Mekong River Delta or Southwest. Samples are guaranteed in all areas with uniform proportions.

According to Hinkin, an ideal sample size should have an item-to-response proportion ranging from as low as 1:4 to as high as 1:10 for each set of scales to be factor examined. In this study, there were 25 items to be assessed; hence, an ideal sample size should be between 100 and 250 respondents for adequate factor analysis. From this perspective, a total of 307 responses from the collected data were found to be usable after excluding partial returns and missing responses (whether in the scale section or the demographic section).

Based on the results of the literature review, the research team built a scale and questionnaire to conduct research directly and online through Google Forms for consumers in Vietnam, the data collected is for quantitative research.

### 4.2. Data Analysis

For data processing, the study uses SPSS 20 software to evaluate the reliability of the scale with Cronbach's Alpha numerical system and exploratory factor analysis (EFA), valid variables will be included in the analysis. by describing the partial least squares structural configuration (PLS-SEM) using SMARTPLS 3.0 software. Structural Equation Modeling (SEM) is a second-generation statistical analysis technique developed to analyze multidimensional relationships between multiple variables in a model (Haenlein & Kaplan, 2004). Linear structural modeling (SEM) is evaluated as a modern and popular data analysis method, used by many researchers to test research models in many different fields. The study

uses partial least squares structural equation model (PLS-SEM) to test the hypothesis because PLS-SEM has outstanding advantages: (1) Ignoring problems related to small sample size, the data is not normally distributed; (2) Can estimate complex research model with many intermediate, hidden and observed variables, especially structural model; (3) Suitable for exploratory studies, research based on undeveloped theory (Joseph F. Hair et al., 2019).

The partial least square structural equation modeling (PLS-SEM) was used to estimate and test the hypothesized model. The minimum sample size for a PLS model should be at least ten times the largest number of inner model paths directed at a particular construct in the inner model (Barclay et al., 1995). In the present case, the sample size was 307, which was more than the minimum required (Hair et al., 2017). Furthermore, the reason for choosing PLS is that it requires no distributional assumptions, whereas SEM assumes a normal distribution for the data. In addition, research supporting the claim for PLS having greater efficacy at small sample size is inadvertently misleading as it has focused on accuracy rather than statistical significance (Goodhue et al., 2006). The PLS-SEM is a multivariate technique and is being used in various functional areas of management such as accounting (Lee et al., 2011), marketing (Hair et al., 2012), operations management (Peng and Lai, 2012), etc. PLS-SEM is useful for predictive purposes and exploratory research. The technique is very widely used by researchers when the data are non-normal and the sample size is small (Reinartz et al., 2009).

## **5. RESULTS AND DISCUSSION**

### **5.1. Descriptive statistic**

#### **5.1.1. Sample Profile**

Gender of the respondents: the percentage of women participating in using mobile commerce was higher at 56.03% compared to that of men at 43.97%.

Age of respondents: regarding generational distribution, Gene X (1965-1980) accounts for 30.29%, followed by Gene Y (1981-1996) with 38.11%, and Gene Z (1997-2012) representing 31.6% of the generations. Some other individuals had limited access to mobile phones, faced challenges in adapting to new technology, or did not require mobile money usage.

Respondent's residence: evenly distributed in areas with the rate of 14.66% respectively in the North West; 13.68% in the Mekong Delta; 13.03% in the Northeast; 12.7% in the Central Highlands; 12.38% in North Central; 12.05% in the Southeast; 11.4% in the Red River Delta and finally 10.1% in the South Central Coast.

Education level: respondents mainly graduated from University/College with 40.07% and High School/Vocational Intermediate with 33.88%. The remaining interviewees accounted for 14.1% with postgraduate qualifications, 9.77% had graduated from lower secondary school, and 2.28% had achieved only an elementary level of education.

*Occupation:* the research team conducted a comprehensive survey across various occupational groups, ensuring equal representation. The surveyed members consisted of: 11.07% students/students, 10.75% office assistants, 9.77% employees with advanced technical expertise, 9.45% simple laborers, 9.45% leaders, 9.45% skilled workers in agriculture, forestry, and fishery, 8.79% individuals working in personal services, security, and sales, 8.47% skilled craftsmen and other related technicians, 8.14% assemblers and operators of machinery and equipment, 6.84% workers with intermediate technical skills, and 7.82% from various other occupations.

*Income:* The majority of interviewees have an average monthly income of 4-9 million (accounting for 37.13%); next, people with incomes in the range of 9-14 million accounted for 28.66%; the rest of other income levels account for 10.75% of people with incomes in the range of 14-19 million; 10.75% of people with income between 19 million and more; 8.47% of people with income below 4 million and 4.23% of survey respondents have no income.

### **5.1.2. The current situation of using mobile money of consumers in Vietnam based on the survey results of the research team**

*Using mobile money services of carriers:* The data obtained shows that Viettel's mobile money users are the highest: 144 people (42.1%); The second is VNPT with 112 people (32.7%) and the last is MobiFone with 86 people, accounting for 25.1%.

*Accessing:* According to survey data, the majority of people using mobile money were recommended by their friends (55.0%); Advertising on television, social networks (45.8%); Referred by relatives (43.6%); Referral colleagues (33.9%); Mobile money dealers (21.1%); Public transport advertising (bus, taxi...) (20.9%) and other reasons/options (5.7%).

*Frequency of seeing mobile money ads:* According to a survey on mobile money users in Vietnam, in 1 week, the frequency of users encountering mobile money ads is mostly less than 3 times /week (55.6%); 3 to 6 times/week (38.9%) and more than 6 times/week (5.6%).

*Frequency of using mobile money services:* According to survey results, the majority of people use mobile money services more than 6 times/month, accounting for 56.4%; from 4 to 6 times/month, accounting for 22.8%; from 2 to 4 times/month accounted for 13.2% and less than 2 times/month accounted for 7.6%. This frequency explains that users have not favored using mobile money services regularly in transactions and daily life. This is influenced by the majority of consumers who use other financial methods and services such as e-wallets, online banking, and mobile banking.

*Percentage of respondents using other financial services:* According to the results of the research team, up to 95.3% of respondents use other financial services such as e-wallets, online banking, and mobile banking... and the remaining 4.7% are not. This can be explained by the fact that most consumers now have access to mobile commerce, and the popularity and utility of mobile commerce applications also motivate users to use them. This also partly leads to the low number of people using mobile money services compared to other financial services and applications.

*Percentage of having agents, and mobile money transaction counters (Viettel, VNPT, MobiFone) at the respondents' places of residence:* According to the survey data obtained, 93% of the places where the respondents reside have agents, agents and mobile money counters (Viettel, VNPT, MobiFone) and the remaining 7% are not available. The frequency of explaining the popularity and investment to agents of carriers in Vietnam also contributes to promoting and creating good conditions for consumers to access mobile money and services.

*Using mobile money for the following purposes:* The majority of users use services when there is a need for telecommunications services (Top up phone cards, scratch cards, buy packages, ...) accounting for 64, 6%; Money transfers and receipts accounted for 61.4%; Bill payment (Electricity, water, Internet, ...) accounted for 55.3%; Shopping, entertainment (Lotto...) accounted for 28.9%; Finance, insurance (borrowing money, savings ...) accounted for 23.1%; Travel, tourism (Hotel booking, ...) accounted for 13.5% and other purposes accounted for 16.1%.

*Reason for knowing/choosing mobile money service:* According to survey data, the majority of people use mobile commerce because friends refer (55.0%); Advertising on television, social networks (45.8%);

Referred by relatives (43.6%); Referral colleagues (33.9%); Mobile money dealers (21.1%); Means of transport (bus, taxi...) (20.9%) and other reasons/options (5.7%).

**5.2. Scale’s reliability**

**\* Cronbach’s Alpha (CA)**

As a rule of thumb, a reliability coefficient of 0.70 or higher is considered “acceptable” in social science research (Nunnally, 1978). Table 2 shows the results of reliability coefficients. Most variables achieved an acceptable level of internal consistency since all scores were greater than the rule of thumb (>0.70). Technology anxiety obtained the highest Cronbach’s alpha (.914), whereas Attitude toward mobile money obtained the lowest alpha (.752). Thus, the remaining 25 observed variables continue to be included in the EFA exploratory factor analysis.

**Table 2: Cronbach’s Alpha (CA)**

Scale		Item-Total Statistics			Scale		Item-Total Statistics		
		Corrected Item-Total Correlation	Cronbach’s Alpha if Item Deleted	Cronbach’s Alpha			Corrected Item-Total Correlation	Cronbach’s Alpha if Item Deleted	Cronbach’s Alpha
Self-efficacy (SE)	SE1	.601	.737	.790	Perceived ease-of-use (PEOU)	PEOU1	.668	.837	.860
	SE2	.635	.719			PEOU2	.717	.817	
	SE3	.601	.737			PEOU3	.707	.821	
	SE4	.556	.758			PEOU4	.733	.810	
Technology anxiety (TA)	TA1	.791	.893	.914	Attitude toward mobile money (AT)	AT1	.583	.675	.752
	TA2	.802	.888			AT2	.564	.688	
	TA3	.829	.879			AT3	.548	.694	
	TA4	.797	.892			AT4	.505	.721	
Perceived usefulness (PU)	PU1	.640	.798	.833	Intention to use mobile money (IU)	IU1	.552	.762	.787
	PU2	.623	.803			IU2	.630	.719	
	PU3	.649	.795			IU3	.573	.745	
	PU4	.657	.793			IU4	.636	.712	
	PU5	.597	.811						

(Source: Data processing results using SPSS 20.0)

**\* Exploratory Factor Analysis**

The results of EFA analysis stopped at the first rotation. The Kaiser-Meyer-Olkin measure of sampling adequacy was found to be 0.907 > 0.5; Bartlett’s test has the coefficient Sig.= 0.000 < 0.05. Thus, the application of factor analysis was deemed appropriate.

The value of Eigenvalues of all factors is high (>1), the 6th factor has the smallest Eigenvalues coefficient of 1,085 > 1. The standard for accepting extracted variance is when the total variance is extracted (Total Variance Explained) > 50%. The factors selected explain 56,010% of the variances of the variables. Conclusion: 56,010% change of factors is explained by observed variables. Thus, after analyzing EFA exploratory factors, 6 scales with 25 observed variables were extracted.

**Table 3: Rotated Component Matrix**

	Factor					
	1	2	3	4	5	6
TA3	.879					
TA2	.859					

TA1	.857					
TA4	.826					
PU3		.753				
PU2		.708				
PU4		.686				
PU1		.589				
PU5		.547				
PEOU1			.718			
PEOU2			.709			
PEOU3			.692			
PEOU4			.655			
IU2				.778		
IU4				.698		
IU1				.665		
IU3				.505		
SE2					.727	
SE3					.675	
SE1					.589	
SE4					.587	
AT2						.715
AT4						.651
AT1						.626
AT3						.624
Eigenvalue	8.105	3.300	1.470	1.351	1.310	1.085
Variance	30.581	12.117	3.855	3.504	3.337	2.616
<b>KMO and Bartlett's Test = 0.907 Sig. = 0.000</b>						
<b>Total Variance Explained = 56.010 %</b>						

(Source: Data processing results using SPSS 20.0)

### 5.3. Estimation of measurement and structural model

#### 5.3.1. Measurement model

When evaluating the resulting measurement model on SMARTPLS 3.0, the research will focus on the main issues: quality of observed variables (indicators), reliability, convergence and discriminability of the scales.

#### \* Outer loadings

Two rounds of outer loadings were conducted. A study with an external loading factor (outer loading)  $> 0.6$  was accepted, and an exploratory study accepted an external factor loading factor  $> 0.4$  (Moores & Chang, 2006),  $\geq 0.7$  (Joseph F. Hair et al., 2019). At the first round of outer loadings, TA did not meet the outer loadings test. Thus, TA was removed from the model and was not used in further analysis. At the second round of outer loading, the results show that all observed variables with outer loading coefficients are high  $[0.735 - 0.859] > 0.6$ . The quality of observed variables is guaranteed (Table 4).

**Table 4. Outer loadings**

Scale		Outerloading	Scale		Outer loadings
1. Self-efficacy	SE1	0.813	3. Perceived usefulness	PU1	0.775
	SE2	0.798		PU2	0.735
	SE3	0.768		PU3	0.786
	SE4	0.750		PU4	0.803
2. Perceived ease-of-use	PEOU1	0.813		PU5	0.770
	PEOU2	0.847	5. Intention to use mobile money	IU1	0.748
	PEOU3	0.840		IU2	0.790
	PEOU4	0.859		IU3	0.790
4. Attitude toward mobile money	AT1	0.849		IU4	0.804
	AT2	0.774			
	AT3	0.778			

(Source: Data processing results using SMART-PLS)

**\* Validity and Reliability of Constructs**

According to Hair et al. (2016), internal consistency reliability and convergent validity should be established while testing for moderation effect. In testing the reliability of the construct used two measurements, namely the composite reliability and Cronbach alpha. Construct reliability, both composite reliability and Cronbach’s alpha, was measured to vary from 0 to 1, with 1 being a perfect estimate of reliability, but the construct was declared reliable if the composite reliability and Cronbach’s alpha values were greater than 0.7 (Henseler & Chin, 2010). Thus, the results of the construct reliability and validity tests revealed that the variables of AT, IU, PEOU, PU and SE had reliability coefficients of 0.843, 0.864, 0.906, 0.882 and 0.863, respectively. Besides, based on the Average Variance Extracted (AVE) index to evaluate the convergence of the scale, a scale reaches a convergence value if the AVE is 0.5 or higher (Höck et al., 2010). The construct validity figures for the variables were 0.642, 0.614, 0.706, 0.599 and 0.612 for AT, IU, PEOU, PU and SE, respectively. The results of the construct reliability and validity for the variables are shown in Table 5.

**Table 5. Construct Reliability and Validity**

	Cronbach’s alpha	Composite reliability (rho_c)	Average variance extracted (AVE)
AT	0.723	0.843	0.642
IU	0.791	0.864	0.614
PEOU	0.861	0.906	0.706
PU	0.834	0.882	0.599
SE	0.790	0.863	0.612

(Source: Data processing results using SMART-PLS)

**\* Discriminant validity**

To evaluate the discriminant of the scale, the study used the Heterotrait-monotrait Ratio (HTMT). The discriminant value between the two latent variables is guaranteed when the HTMT index is less than 0.9 (Henseler et al., 2015). Research results in Table 5 show that the discriminant of the scale is very good, which means that all HTMT values are much smaller than the threshold of 0.85. Thus, the factors all meet the requirements of discriminant value. These results are indicated in Table 6.



**Table 6. Discriminant Validity for the constructs (HTMT)**

	AT	IU	PEOU	PU	SE
AT					
IU	0.635				
PEOU	0.578	0.713			
PU	0.625	0.657	0.740		
SE	0.570	0.596	0.684	0.643	

(Source: Data processing results using SMART-PLS)

### 5.3.2. Evaluate SEM model configuration on SMART PLS

Before evaluating the structural model, in order to be able to generalize the research results to the whole, the model needs to be tested for reliability. The authors used the bootstrapping technique with a repeated sample size of 1000 observations (n=1000). Estimation results from 1000 observations show that the original weights are significant with the mean weights of bootstrapping. The estimates in the model can be concluded to be reliable because all the weights are within the 95% confidence interval.

To evaluate the structural model, it is necessary to consider: the multicollinearity evaluation VIF coefficient, the impact coefficient and the significance of the impact levels, and the coefficient R Square, f Square.

#### \* Collinearity statistics (VIF)

Another vital checking involved checking collinearity issues. If the VIF more than 5, the model is likely to appear multicollinear (Joseph F. Hair et al., 2019). The structures in the SEM model in Table 7 have VIF coefficients [1,000 - 1.664] all less than 2, so there is no collinearity issue.

**Table 7. Collinearity statistics (VIF)**

	AT	IU	PEOU	PU	SE
AT		1.000			
IU					
PEOU	1.664				
PU	1.664				
SE			1.000		

(Source: Data processing results using SMART-PLS)

#### \* Coefficient of determination (R-square)

The adjusted R-squared reflects the explanatory level of the independent and dependent variables in the research model. In the study, the adjusted R-squared of IU was 0.240, so the independent variables explained 24% of the variation (variance), the remaining 76% was from systematic error and from other factors. outside the model.

**Table 8. R - Square**

	R-square	R-square adjusted
AT	0.282	0.277
IU	0.243	0.240
PEOU	0.324	0.321

(Source: Data processing results using SMART-PLS)

**\* F-Square**

The coefficient f Square evaluates the strong and weak impact of the independent variable on the dependent variable. The f Square index to evaluate the importance of the independent variables is as follows: f Square < 0.02 level of impact is extremely small or no impact;  $0.02 \leq f \text{ Square} < 0.15$  is small impact;  $0.15 \leq f \text{ Square} < 0.35$  average impact; f Square  $\geq 0.35$  is a large impact (Cohen, 1988). According to the obtained data, the impact level of variable AT on IU is average with f Square value of 0.321.

**Table 9. F-Square**

	AT	IU	PEOU	PU	SE
AT		0.321			
IU					
PEOU	0.048				
PU	0.100				
SE			0.478		

*(Source: Data processing results using SMART-PLS)*

**\* Testing Hypothesis**

In the end, a bootstrapping method was implemented in smart PLS to determine the path coefficient and its associated t-value for both the direct and mediating relationships. Path Coefficients is the regression coefficient of the path model representing the relationship between latent variables in the SEM model. At this step, no impact path has been concluded with statistical significance or no statistical significance.

The results of Path Coefficients after Bootstrap analysis are shown in Table 10. The smart PLS results showed that all the direct impacts are positive and significant, consequently, hypotheses H1, H3, H4 and H5 were supported respectively. The Original Sample (O) column shows the specific relationship between the variables in the SEM model, in which: The variable AT is dependent, under the influence of two variables, PU, and PEOU with the corresponding standardized regression coefficients. is 0.346; 0.240. Variable IU is dependent, under the influence of variable AT with a standardized regression coefficient of 0.493. Additionally, all the specific indirect effects were found to be positive and significant supporting the mediation effects of attitude in the relationships between: perceived ease of use and intention to use mobile money (t-value = 2.771, p = 0.006<0.05); perceived usefulness and intention to use mobile money (t-value = 4.257, p = 0.000<0.05), hence supporting hypotheses H6 and H7 was supported.

**Table 10. Study Tested Hypotheses**

Paths	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistic (O/STDEV)	P values	Results
SE -> PEOU	0.569	0.571	0.058	9.732	0.000	Accepted
PEOU -> AT	0.240	0.241	0.074	3.225	0.001	Accepted
PU -> AT	0.346	0.348	0.071	4.861	0.000	Accepted
AT -> IU	0.493	0.498	0.050	9.805	0.000	Accepted
PEOU -> AT -> IU	0.118	0.121	0.043	2.771	0.006	Accepted
PU -> AT -> IU	0.170	0.173	0.040	4.257	0.000	Accepted

*(Source: Data processing results using SMART-PLS)*

Figure 2 shows the structural path model:

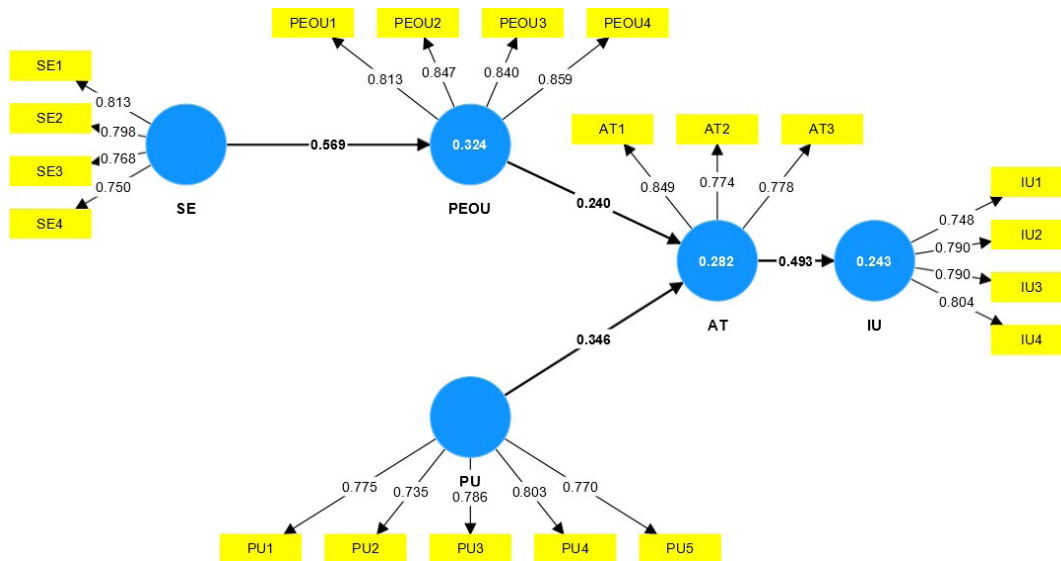


Figure 2. Structural Model Assessment

(Source: Data processing results using SMART-PLS)

This study was established to examine direct factors influencing intention to use mobile money of Vietnamese consumers and the indirect effect through attitudes toward mobile money. As hypothesised, the results of structural equation modelling using Smart PLS (version 3) analysis supported 4 out of the 5 the direct paths and all paths were positive and significant. More specifically the findings supported the first set of research hypotheses. First, there was a direct positive significant impact of Self-efficacy on the perceived ease-of-use, which supported H1. Second, there was a direct positive significant impact of Perceived ease-of-use on attitude toward mobile money supporting H3. Third, the results supported H4 on a direct positive significant impact of Perceived usefulness on attitude toward mobile money. Fourth, the results supported H5 on a direct positive significant impact of Attitude toward mobile money on intention to use mobile money, which supported H5. These results extend the use of TAM by integrating self-efficacy (SE) and confirming that perceived ease-of-use and perceived usefulness, are determinants of attitude and have an impact on attitude toward mobile money, which also coincidence with the results of previous research studies, e.g., (Lin, (2011); Deb and David (2014); Yousafzai et al. (2007)). The abovementioned analytical results reveal that the research model examined in this study is acceptable.

Self-efficacy in mobile money service (SE) has the highest normalized importance. This finding supports prior researches on mobile payment acceptance (Bailey et al. (2017); He et al. (2018)). Notably, self-efficacy will lead a consumer to believe in his or her ability or to see the procedure of performing mobile money ease-of-use, therefore carrying out successfully mobile money adoption.

PU is the more significant factor in determining AT as well as the one having the higher normalized value than PEOU. This can be explained by mobile money services remain a relatively new phenomenon in the field of e-business, and most mobile financial companies are still in an early stage of diffusion. Moreover, users will be unwilling to welcome the novel technology if they do not know how it works. Supporting for this result is earlier empirical studies in mobile banking of Muñoz-Leiva et al. (2017).

Besides, this study detected that two factors impact attitudes significantly towards the application of mobile money, including perceived perceived ease-of-use and perceived usefulness. The results presented

that mobile money users in Vietnam are not only attracted by the usefulness of mobile money services, but are also concerned with the ease of use in its operations.

Additionally, this study showed a significant influence of AT in predicting the IU, which is consistent with the prior study (Bailey et al. (2017)). According to the findings of this study, a person has a good attitude about using mobile money, behavioral intention to use it will follow.

## **6. CONCLUSION**

### **6.1. Policy implications**

Vietnam is full of approving conditions to develop mobile money payment products and services, contributing to promoting non-cash payments and meeting the increasing needs of the people. However, consumers' attitudes towards mobile money are still not very positive with this new type of service because of risks in customer authentication (KYC), technology, and telecommunications infrastructure... Therefore, with the aim of deploying mobile money services effectively, it is necessary to minimize risks by limiting the scope of activities, geography, goods, services and transaction norms; Enterprises can upgrade and invest in infrastructure and telecommunications networks; promote communication about the beneficial features of mobile money to enhance positive attitudes towards service intention.

This finding is particularly important for organizations in formulating effective strategies for service delivery channels to retain and expand their existing customer base. Managers need to focus more on using marketing communications in order to widely publicize the advantages associated with the use of mobile money. Bankers and mobile network operators can use advertising to influence consumers' attitudes toward financial services, which, in turn, affects the intention to use this new payment method. Word-of-mouth (WOM) is another way to influence consumers' attitudes that can take place in a telephone conversation or within the context of a chat group on the internet (Kasper Helsdingen and Vries, 1999). Thus, both advertising and WOM processes offer special solutions to the problem of intangibility of services and they might help to overcome a service's problem of credibility (Bayus, 1985). Furthermore, personal selling is another way to increase customer awareness and influence their attitudes (Burnett and Moriarty, 1998; Kasper et al., 1999). Besides, mobile money service providers need to improve security features in their systems to assure customers that e-banking services are secure. Emphasize positive safety features that can contribute to changing negative customer perceptions, collecting data on customer preferences and feedback to enhance the service's value. This can be done through online surveys and/or a discussion forum. Such actions can improve the intention to use mobile money services in particular and cashless payment methods in general.

### **6.2. Limitations**

Several limitations were found in this research. Firstly, research was conducted in Viet Nam, hence, results may not generalize customer attitudes towards mobile money to other geographies. Future researchers can overcome such limitations by carrying out a cross-country comparative study. Secondly, it used a cross-sectional survey approach and the effect of time was consequently not examined. It is suggested that a longitudinal survey may be conducted in the future. In addition, another limitation is that it uses multiple-choice responses, which does not certainly give as much freedom in responses as free-form responses do and may lead to unreliable data. On the other hand, the survey directed at the use of mobile money would allow a more in-depth and specific analysis of the relationship between attitude and intention to use mobile money. Finally, there should be an analysis of the impact of customer loyalty or customers' character traits on customer intention.

### 6.3. Further research direction

Digital financial services in the form of mobile money have a positive quantitative and qualitative impact on the development of financial inclusion in the developing economy. Therefore, the common question that is currently being raised is how consumers can effectively use mobile money to promote financial transactions in remote and disadvantaged areas. Basically, future research orientation will beneficially apply the influence of mobile money to the development of non-cash payment activities, enhancing the accessibility and use of specialized financial services in rural areas, remote, frontier and islands of Vietnam. Therefore, following research directions will focus on the right awareness of customers about the beneficial features of mobile money. When fully understanding and grasping mobile money usage information, users will then change their beliefs as well as service usage trends to match the customer's behavior and social motivation. Additional research should be conducted as this study does not cover all the variables that affect the intention to use mobile money services. With appropriate expansion variables, the following research should cover a wider range, with a larger sample size and higher objectivity; focus on other variables, such as the influence of the social environment, confidentiality, riskiness, and legal corridors. On the other hand, conducting comparative research in other countries with similar conditions would also greatly enrich and enhance current knowledge.

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## FACTORS AFFECTING LEARNING MOTIVATION OF STUDENTS IN INTERNATIONAL TRAINING PROGRAMS AT THUONGMAI UNIVERSITY

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**Abstract:** *The research explores learning motivation among students in the international training program at ThuongMai University, aiming to identify influential factors and propose strategies to enhance learning quality. A comprehensive data collection approach, including interviews, surveys, and secondary sources, is utilized. The analysis reveals that student skills have the most significant impact on learning motivation, followed by the curriculum and job demands. However, factors such as bachelor's program characteristics, learning environment, faculty, passion, and family have a comparatively lesser influence. These findings contribute to a deeper understanding of how to improve students' learning motivation in an international educational context and provide valuable insights for educational practitioners.*

**Key words:** *international training programs, learning motivation, students, factors.*

### 1. INTRODUCTION

In recent years, determining learning motivation and the relationship between learning motivation and learning outcomes of learners has been attracting the special attention of many researchers in Vietnam. If learners have the right motivation, they will be more active in their studies, take exams more honestly, and pay more attention to study and self-study skills, hone the skills needed for their future. In other words, learning motivation plays an important role in orienting and stimulating learners' learning activities. As the factors affecting learning motivation receive great attention from schools, students, and parents around the world, studies on learning motivation have also resulted in great results there are many authors about this topic in Vietnam as well as in the world such as Nguyen T.M.L. (2021); S.E, Z.K (2016); Hamidah A.R., A.R., Shah R.A.W., Faizah M.N., Wan Z.W.Z., and M.A.B. (2017); E.H., N.Y.K. (2021) They have shown that family and teacher factors have a significant impact on student's motivation. Some other studies suggest that the new learning environment is the same as that of Pinar C. (2011); MSc. Le N.D.T., MSc. Nguyen M.L., (2021).

Based on the aforementioned research review, it is evident that although there have been numerous studies conducted on learning motivation both domestically in Vietnam and internationally, there is a significant gap in the literature concerning the learning motivation of undergraduate students, particularly within the context of the Thuongmai University's international associate program. Moreover, the research team's focus on providing solutions to enhance students' learning motivation for the purpose of improving the overall quality of education adds a novel aspect to their study compared to previous research endeavors.

Consequently, our research project was undertaken with the primary objective of investigating and analyzing the factors that influence the learning motivation of international undergraduate students enrolled in the Thuongmai University. Furthermore, our aim was to identify the most influential factors among these variables and subsequently propose recommendations to both students and the university administration, in order to devise effective strategies for enhancing students' motivation to learn and thereby facilitating improved learning outcomes. Additionally, it is important to acknowledge that the ultimate goal of this

research endeavor is to create favorable conditions for students, enabling them to access numerous opportunities within the job market upon their graduation.

Research objectives and research questions in the study: When conducting research on the factors influencing the learning motivation of undergraduate students in the international associate program at Thuongmai University, the authors have set the following objectives:

- Identify the factors that influence the learning motivation of undergraduate students in the international associate program at Thuongmai University.
- Evaluate the level of influence of each factor on the learning motivation of students.
- Propose solutions to support and enhance the learning motivation of students, aiming to improve their academic performance and teaching quality.

Thus, the research topic aims to answer three main questions:

- What factors influence the learning motivation of undergraduate students in the international associate program at Thuongmai University?
- Which factor has the greatest impact, and which factor has the least impact?
- How can we improve the factors that have the strongest impact on the learning motivation of students to enhance their learning quality?

## **2. LITERATURE REVIEW**

### **Motivation concept**

Hilgard, E. R. (1977) states that motivation is any state that affects the willingness to initiate or continue a certain behavior. Nguyen Quang Uan et al. (2003) also said that motivation is what motivates people to work to satisfy needs, which gives rise to positivity and determines the tendency of that positive direction. Motivation is a direct stimulus, a direct cause of behavior. (Nguyen Quang Uan, 2003). Each author has different views, but between them, there is still a common point: motivation is a psychological factor that determines the choice and direction of human behavior. Motivation is what is reflected in the human head, motivating people to act to satisfy certain needs.

### **Learning motivation concept**

The term “motivation to learn” stands for a series of cognitive and emotional processes that enable self-control toward goal-directed behavior. Thus, learning motivation can be understood as a general term for all the emotional and cognitive processes that help learners learn something new. The degree of learner’s motivation to learn depends on the changing relationship between the personality characteristics of the learner (ability, level of motivation) and the incentives of the personal situation that can be affected. influenced by the teacher. (Stangl, 2022).

### **Factors affecting learning motivation**

There have been studies conducted both domestically and internationally investigating the factors influencing learning motivation, with the main factors identified as follows:

#### **Instructor-related factors**

According to research by Elliot (2009), teachers’ classroom management skills are the main determinants of forming an effective classroom atmosphere. The communication skills that teachers have in this field have a very important place in student motivation. The teacher-student relationship is established in a qualified communication environment and self-confidence affects both student motivation and academic success



positively (Erwin, 2003). In addition to formal classroom communication skills, informal communication outside the classroom strengthens the relationship between educators and students (Pogue and Ahyun, 2006; Jones, 2008). In this way, students have the opportunity to share their topics and problems with the teacher and stay active in a way that is more motivated, and feeling more valued (Jaasma and Copper, 1999; Lau, 2003).

### **Requirements of the job**

In the research of Nguyen Ba Chau (2018), there is a mention of a factor affecting the CTU which is: “The factor that requires the society in terms of qualifications, capacity, skills, ... to meet the requirements of the public sector. The job is the objective factor that has the strongest influence on students’ academic achievement, ranked No. 1. This shows that the influence of the market economy in today’s society has been posing opportunities and challenges. for SVs. This result shows that students are aware of the new requirements and requirements of society about human resources. To get a job in the right major, a high salary is the desire of students and it is also a motivation for students to strive. Therefore, this factor is assessed by students as having the most influence on their academic achievement”. (Nguyen Ba Chau, 2018)

### **Family factors**

Studies around the world have shown that the lack of support from parents in career orientation has a negative impact on children’s career decision-making and causes many challenges in the career development process. such as uncertainty in career choice, inability to make career decisions or lack of confidence in a career (Constantine et al., 2005). On the contrary, there are individuals who, despite not having favorable environmental factors, still have good career goals and are confident that they will achieve the career goals they pursue. These people tend to have professional achievements and are largely due to the support and companionship from their parents regarding their career choices (Constantine et al., 2005). This has shown the importance of the family, especially parents, to their career orientation as the learning motivation of their children.

### **Study environment**

According to the research of lecturer Phan Thi Cam Giang (Vietnam Women’s Academy, Vietnam), the factor of facilities conditions accounts for 92.8%. These factors can be grouped together as learning environment factors, and through this result, the learning environment factor is also a factor that has a significant influence on student’s academic achievement. (Phan Thi Cam Giang, 2021). Research by Tran Thuy Nghiem (2018) also makes the following statement: “The learning environment is favorable, which means that there is close attention of the academic advisor to students, the transfer of knowledge in a way. science and enthusiasm of lecturers, friends in class unite and support each other in learning; no when the class is fun and exciting

Many class activities are organized so that students have the opportunity to have fun and practice themselves. That will help students feel secure and excited in learning.” (Tran Thuy Nghiem, 2018)

### **Curriculum and content of instruction**

Textbooks and lesson content also account for a high percentage of the factors affecting students’ learning motivation, with rates of 96.8% and 94.4%, respectively (Phan Thi Cam Giang, 2021). According to the research of Nhan & Thuy (2014), it is necessary to develop a training program with modules associated with knowledge and practical skills of the profession; through which, students can apply their learning knowledge and skills to work practice, meeting the needs of today’s tourism labor market. Lecturers should invest in building curriculums or lectures that are aesthetically pleasing, vivid, and highly intuitive; In addition, the documents provided to students must ensure clarity. Using active teaching methods and diversifying methods will help learners gain interest. (Human & Thuy, 2014).

**Thuongmai University.**

**Features of the training system**

The number and scale of international joint training programs being implemented at the Institute of International Training is constantly expanding at undergraduate and graduate levels, especially international joint training programs. economics in English. The affiliated partners of the Thuongmai University are all prestigious universities of the Republic of France, Austria, Great Britain, Canada, China, Taiwan, etc. These are also advanced training programs. Modernization allows the addition of high-quality human resources with appropriate qualifications and good communication skills in foreign languages for Vietnamese enterprises, contributing to improving the competitiveness of enterprises. Vietnam in the context of international integration. (International Training Institute -2022)

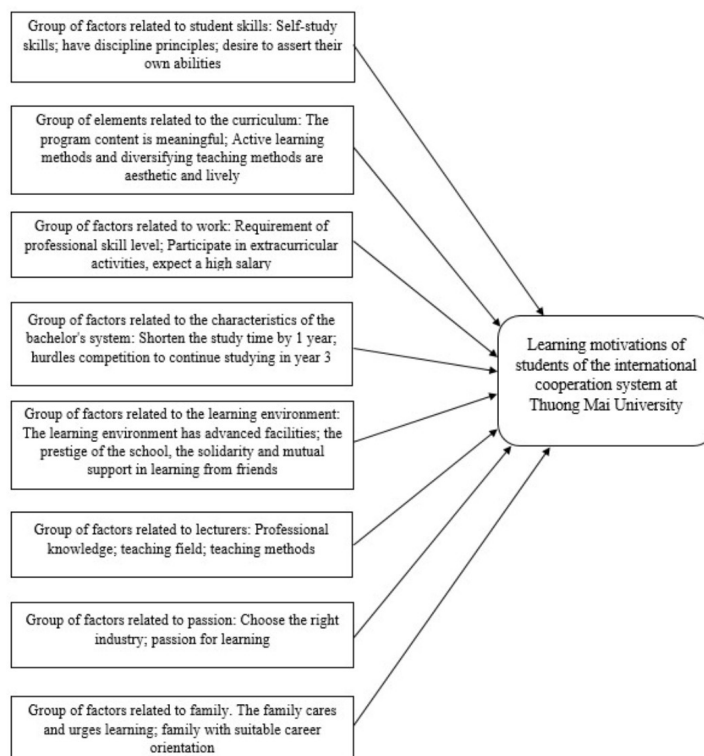
**Passion and interest in the field of study**

According to a research article by Nguyen Ba Chau (2018), interest in learning is also believed by many students to have a great influence on their learning motivation. Interest in learning will help students overcome difficulties and obstacles to accomplish their own goals. If there is apathy and boredom toward learning, nothing can be achieved. Therefore, this factor is also chosen by the majority of students. The remaining two factors are own personality and own learning ability, which are also assessed by students as having a great influence on learning motivation. (Nguyen Ba Chau, 2018)

**Student learning ability**

According to Van Pham, Hoa Le, and Nguyen Thi, current students are also aware of the role and importance of self-study time. This shows that if students focus on learning a lot, they have higher academic achievement. Pourtaaharian (2016) has also shown the relationship between study habits and cognitive discipline that affect learning motivation for students to improve.

**Research models**



**Research Hypothesis**

Hypothesis 1: Factors related to lecturers have a positive impact on the learning motivation of students of the international cooperation system at the Thuongmai University

Hypothesis 2: The demanding factor of work has a positive impact on the learning motivation of international students at the Thuongmai University.

Hypothesis 3: The influence of family has a positive impact on the learning motivation of international students at the Thuongmai University.

Hypothesis 4: The learning environment has a positive impact on the learning motivation of students of the international cooperation system at the Thuongmai University.

Hypothesis 5: The program and teaching content have a positive impact on the learning motivation of students of the international cooperation system at the Thuongmai University

Hypothesis 6: The characteristics of the training system have a positive impact on the learning motivation of students of the international linkage system at the Thuongmai University.

Hypothesis 7: Passion and interest in the field of study have a positive impact on the learning motivation of students of the international association system at the Thuongmai University.

Hypothesis 8: Student learning ability has a positive impact on the learning motivation of international students at the Thuongmai University.

### **3. METHODOLOGY**

#### **3.1. The scale**

The eight primary variables of the scale were obtained from diverse sources. Consequently, Instructor-related factors, Requirements of the job, Family factors, Study environment, Curriculum and content of instruction, Features of the training system, Passion and interest in the field of study, and Student learning ability are expected to influence an individual's inclination towards learning motivation.

#### **3.2. Sample and data collection**

To address the research questions, we employed both qualitative and quantitative research methods. Regarding the qualitative research method, we utilized it to gather and analyze qualitative data related to the objectives, training programs, and factors influencing the model, as well as the desired improvements in learning motivation. The quantitative research was used to validate scales and determine the level of influence of the factors.

##### **Data Collection Method**

##### **In-depth Interviews:**

In this study, we employed the in-depth interview method to refine the research model regarding the factors influencing the learning motivation of students in the international affiliate program at the ThuongMai University. To conduct in-depth interviews, we interviewed three faculty members and five students from the international undergraduate program. These faculty members had extensive experience in teaching the international training program at Thuongmai University. The students represented various majors within the international programs. We also utilized in-depth interviews to explore the desires and solutions put forth by both faculty members and students to enhance learning motivation.

##### **Survey by questionnaire:**

The objective of this method is to validate the constructed model regarding the groups of factors influencing the learning motivation of students in the international affiliate program and to determine the extent

of influence of each factor. Conducting a survey through a questionnaire with learners helps validate the model and answer the research hypotheses and questions. We conducted a survey with a sample of 276 participants, who were students enrolled in the international undergraduate program at the ThuongMai University, from the 16th to the 19th cohorts. The sampling method used was convenience sampling. The survey questionnaire was divided into two main sections: Section 1 included questions related to the learners' personal information, such as their cohort, gender, major, and level of goal-setting frequency for studying. Section 2 comprised 50 questions related to the eight factors constructed in the model. We employed a 5-point Likert scale to measure the extent of influence of each factor on students' learning motivation.

### 3.3. Data analysis methods

The qualitative data from in-depth interviews and group discussions, including notes, recordings, synthesis, and summarization, were processed and analyzed. The quantitative data from the survey were analyzed using two methods: descriptive statistics and statistical techniques such as factor analysis, reliability analysis, and regression analysis, performed using SPSS 25 software

## 4. RESEARCH FINDINGS

### **Factor analysis show the items remained for regression analysis are below:**

*Factor analysis results revealed the following factors related to faculty members (GV):* only observed variables met the requirements for factors related to faculty members, including extensive knowledge and high level of specialization, interesting teaching field, and teaching methods employed by the faculty members.

*Factors related to job characteristics (CV)* included variables that met the requirements, such as the requirement for qualifications and specialized skills, participation in extracurricular activities to deepen job-related knowledge, and the desire for a high salary that motivated students' learning.

*Factors related to family background (GD)* included observed variables that met the requirements, such as family support and having a suitable career orientation within the family.

*Factors related to the learning environment (MTHT)* included variables that met the requirements, namely an advanced learning environment with modern facilities that enhanced students' passion for learning, the credibility of the university that provided significant motivation for learning, and the unity and support from peers in studying that increased students' learning motivation.

*Factors related to personal passion (NEM)* included observed variables that met the requirements, such as choosing a field of study aligned with one's passion, which consistently sparked interest in learning, and a genuine enthusiasm for learning that facilitated concentration in class.

*Factors related to student skills (KNSV)* included observed variables that met the requirements, including self-directed learning skills with clear learning goals and a desire to improve one's learning, self-discipline in studying, and the affirmation of learning abilities.

*Factors related to teaching program content (CTGD)* included observed variables that met the requirements, such as meaningful teaching content, active and diversified teaching methods, and aesthetically pleasing, vivid, and intuitive teaching materials or lectures.

*Factors related to the characteristics of the bachelor's program (DTHCN)* included observed variables that met the requirements for factors related to the specific nature of the bachelor's program, such as a shortened study duration of one year compared to the regular program and overcoming hurdles in order to continue studying in the third year.

After factor validation, reliability testing, and correlation analysis, the research team developed a model that illustrates the impact and degree of influence of these factors on the learning motivation of

students in the international associate program at Thuongmai University. The model is as follows: [Please provide the specific model for further translation.]

#### 4.1. Model and hypotheses testing

The survey took place over 5 months from October 2022 to February 2023, on a total of 276 students in the international joint training system of the University of Commerce. According to the collected data shown in Table 1, the number of female students who participated in the survey at schools accounted for a larger share than the number of male students, a common characteristic of the number of schools in the field of economics. Besides, the number of students participating in the survey is also concentrated in the range K17–K19, mainly students majoring in e-commerce and digital marketing (26.5%); K16 students participated in an insignificant number (2 people). Through the survey, the research team concluded that the students of The international joint training system regularly sets learning goals for themselves at 45.7%, and only a very small number of students never set learning goals (19 people, or 6.9%).

Exploratory factor analysis and scale testing were performed on 50 initial questions. Each scale removes 2 to 3 items to make Cronbach's alpha more reliable. Cronbach's alpha of 9 scales is all greater than 0.5 and less than 0.95, which is the level of reliability (Nunnally, 1978). The correlation coefficients of the sum of the components are all 0.3, showing that the scales are valid and reliable. The research model has been reduced from the original 50 items to 23. Indicators The correlation is shown in Table 2.

According to the general model analysis in Table 4, the R value is 0.700. That is, in 100% of the variation of the dependent variable, 70% of the variation is due to the effects of the independent variables included in the model, and the rest is due to random errors or other factors outside the model. impact. The level of impact of these factors is analyzed in detail as follows:

The factors that affect students' learning motivation according to the coefficient analysis in Table 5 with the order from highest to lowest are: 1- "skills of students" ( $\beta = 0.289$ ); 2-"educational program" ( $\beta = 0.250$ ); 3-"work" ( $\beta = 0.167$ ); 4-"specialty of bachelor's system" ( $\beta = 0.150$ ); 5-"Learning environment" ( $\beta = 0.072$ ); 6-"lecturer" ( $\beta = 0.071$ ); 7-"passion" ( $\beta = 0.047$ ); 8-"family" ( $\beta = 0.008$ )

#### 4.2. Discussion

In addition to the common elements described in other earlier research papers both domestically and overseas, such as family, learning environment, lecturers, and educational program, there are other factors in the study paper's content. The research model now includes the qualities of a bachelor, students' interests, and their talents. The aforementioned criteria have been demonstrated through the process of surveying and data processing. have an effect on pupils' motivation for learning

According to the research results mentioned in part 2, the research team came to the conclusion that 8 observed variables including skills of students; educational program ; work; specialty of bachelor's system ; Learning environment; lecturer ;passions and finally family all have an influence on the learning motivation of students of Thuong Mai University's international cooperation system .

### 5. RECOMMENDATIONS

#### 5.1 Recommendations to students

Based on the identified factors that affect students' learning motivation, the research team recommend the following for students of Thuong Mai university in the future:

- Develop your skills: As the survey results showed students who had better skills tended to be more motivated to learn. Therefore, it is important for future students to work on developing their skills to enhance their learning motivation.

- Choose the right educational program: The educational program played a significant role in motivating students to learn. Therefore, future students should carefully select a program that matches their interests and passions.
- Find a balance between work and study: The survey results showed that work can negatively impact students' learning motivation. Therefore, future students should try to find a balance between work and study to avoid burnout and maintain their motivation.
- Consider the specialty of the bachelor's system: The research findings indicated that the specialty of the bachelor's system influenced students' learning motivation. Future students should choose a specialty that aligns with their interests and passions to increase their motivation to learn.
- Consider the specialty of the bachelor's system: The research findings indicated that the specialty of the bachelor's system influenced students' learning motivation. Future students should choose a specialty that aligns with their interests and passions to increase their motivation to learn.
- Pay attention to the learning environment: The learning environment can greatly impact students' motivation to learn. Future students should choose a school that provides a supportive and conducive learning environment such as Thuong Mai University.
- Take courses with engaging lecturers: Lecturers were found to significantly impact students' motivation. Future students should seek out courses that are taught by engaging and enthusiastic lecturers.
- Pursue your passions: The survey results showed that students who were passionate about their studies were more motivated to learn. Therefore, future students should pursue their passions and interests to enhance their learning motivation.
- Utilize family support: Family support was found to positively influence students' learning motivation. Future students should seek out the support of their families to motivate them towards academic success.

## **5.2. Recommendations to Thuong Mai university**

From the results of the study, the research team determined that the University of Commerce can play a very important role in improving the quality of learning motivation of current and future students. Here are some future nominations for the university

- Enhance the Skills of Students: The university can offer more professional development opportunities such as workshops seminars or conferences. These events can provide students with the latest skills knowledge and trends in their field of study.
- Improve Educational Program: Evaluate the academic program regularly to ensure it is aligned with the practical needs of the industry and that it meets the expectations of the students. The curriculum can be updated regularly to maintain the relevance of the skills being taught.
- Focus on Future Work: The University of Commerce can provide students with an understanding of the job market with opportunities to learn and gain experience in the workplace. Also careers fairs and job search can be organized to help students gain more exposure to the current job market.
- Offer Specialization Programs: Offering a Bachelor's program specific to the student's interest or academic strength can help students improve their learning motivation.
- Improve Learning Environment: The university should create an environment that is conducive to learning. For example, the university can provide quiet study areas access to research resources and innovative teaching methods can be used to keep students engaged.
- Improve Lecturer Quality: The university can ensure that its lecturers are knowledgeable enthusiastic and engaging. Lecturers should be committed and passionate about teaching and ensuring their students succeed.

- **Encourage Passion-driven Learning:** The University of Commerce must motivate students to pursue their passions hobbies or interests. Encourage students to take part in extracurricular activities join clubs participate in academic events and take leadership roles.

- **Leverage Family Support:** The University of Commerce needs to involve parents guardians and families in its students' academic journey. The school can schedule open house events conferences or parent-teacher meetings to encourage parent involvement in their students' education.

In conclusion by improving the factors that affect students' learning motivation the University of Commerce can increase students' outcomes while achieving their academic goals.

## **6. CONCLUSIONS, LIMITATIONS, AND FUTURE RESEARCH**

The research focuses on examining the factors influencing the learning motivation of international affiliated students, specifically those at Thuong Mai University. Based on theory and prior study, the authors have developed a research model the primary study methodology used is collecting data using questionnaires and using the statistical software SPSS for data analysis. The findings show that student abilities have the greatest impact on learning motivation.

This research holds significant importance for both the university and the students. For the university, it provides valuable information on the factors influencing the learning motivation of international affiliated students, enabling them to adjust and improve the learning environment, teaching programs, and interactions between faculty and students to create the best conditions for student development. For students, this research enhances their awareness of the factors influencing their learning motivation. They can utilize the research findings to self-evaluate, enhance their skills and abilities, and explore effective approaches to strengthen their learning motivation. Additionally, the research can offer suggestions and solutions to help students maximize the resources and learning opportunities available in the international affiliated environment.

ThuongMai University's foreign associated students are the sole group on whom the research focuses. The conclusions and solutions offered might not be entirely relevant to different situations. Therefore, more study and a wider scope are required to adapt the findings to various situations. To further understand students' viewpoints and experiences, deeper investigations can be carried out using a wider population sample, in-person interviews, and surveys.

Further investigation into the topic of learning motivation among foreign associated students at ThuongMai University and in other educational settings has fascinating new avenues opened up by this study. Investigating the influence of the classroom and instructional strategies in promoting learning motivation among foreign associated students may be one potential topic for future research. Investigating the effects of linguistic, social, and cultural aspects on students' motivation to study helps enhance research. A possible study direction is to contrast various teaching philosophies and techniques to promote learning motivation in foreign students. We can improve the efficiency of instruction and the growth of foreign students in multicultural learning contexts by investigating and developing this study further.

Overall, ThuongMai University's study on the learning motivation of affiliated overseas students has produced important findings and useful data for both the school and the students. Additionally, it creates chances for additional study and the improvement of policies and practices that promote students' willingness to learn, not just in the context of international affiliation but also in diverse areas and nations.

**APPENDIX**

**Table 1: results from the collection of student personal data.**

<b>Name of category</b>	<b>items</b>	<b>Frequency (number of student)</b>	<b>percentage (%)</b>
Number of students participating in the survey	K16	2	0,7
	K17	80	29
	K18	111	40,2
	K19	83	30,1
gender	Male	119	43,1
	Female	157	56,9
The divisions of the international joint training system	E-Commerce & Digital Marketing	73	26,5
	Trade - Sales	23	8,3
	Financial banking	24	8,7
	Tourism and service management	30	10,9
	Management of distribution businesses in the Logistics network	28	10,1
	Marketing and Distribution Management	24	8,7
	Finance - Banking - Insurance	21	7,6
	Human Resource Management	21	7,6
	Start a business	17	6,2
the frequency of students building learning goals	Project manager	14	5,1
	Frequent	66	23,9
	sometimes	126	45,7
	Rarely	65	23,6
Total	Never	19	6,9
		N=276	100

**Table 2: Cronbach's Alpha model and correlation coefficient model of variables**

<b>The sum of the observed variables</b>	<b>Cronbach's Alpha</b>	<b>N of Items</b>
University lecturer	0.613	0.3
Job	0.593	0.3
Family	0.569	0.2
Study environment	0.638	0.3
Passion	0.569	0.2
Student skills	0.629	0.3
Contents of the curriculum	0.607	0.3
Features of the bachelor's system	0.524	0.2
Student's learning motivation	0.554	0.2

**Table 3: KMO model, Bartlett's Test(Sig) model, Total Variance Explained model of observed variables**

<b>The sum of the observed variables</b>	<b>KMO</b>	<b>Bartlett's Test (Sig)</b>	<b>Total Variance Explained</b>
University lecturer	0.631	0.000	56.483
Job	0.637	0.000	55.208
Family	0.500	0.000	69.954
Study environment	0.647	0.000	58.008
Passion	0.500	0.000	69.904
Student skills	0.638	0.000	57.451
Contents of the curriculum	0.642	0.000	56.043
Features of the bachelor's system	0.500	0.000	67.785
Student's learning motivation	0.500	0.000	69.152



**Table 4: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.700 <sup>a</sup>	.490	.475	.64559	.490	32.064	8	267	.000	1.903
a. Predictors: (Constant), ĐTHCNMEAN, GVMEAN, NĐMMMEAN, GĐMEAN, CTGDMEAN, CVMEAN, MTHTEAN, KNSVMEAN										
b. Dependent Variable: ĐCHTEAN										

**Table 5: Model Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.187	.223		.837	.043		
	GVMEAN	.071	.066	.064	1.068	.027	.539	1.857
	CVMEAN	.167	.066	.153	2.517	.012	.515	1.942
	GĐMEAN	.008	.053	.008	.149	.018	.639	1.565
	MTHTEAN	.072	.070	.065	1.034	.032	.476	2.101
	NĐMMMEAN	.047	.059	.047	.793	.029	.532	1.879
	KNSVMEAN	.289	.072	.265	4.019	.000	.438	2.281
	CTGDMEAN	.250	.067	.227	3.742	.000	.521	1.919
	ĐTHCNMEAN	.150	.055	.149	2.746	.006	.653	1.532
a. Dependent Variable: ĐCHTEAN								

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## A STUDY OF FACTORS INFLUENCING THE DECISION OF UNIVERSITY STUDENTS TO CREATE CURRICULUM VITAE ON ONLINE PLATFORMS

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**ABSTRACT:** *Purpose* – The purpose of the study is to determine the factors influencing university students' decisions to create curriculum vitae on online platforms.

*Design/methodology/approach* – The study uses the Theory of Planned Behavior (TPB), the Technology Acceptance Model (TAM), the combined Technology Acceptance model and Theory of Planned Behavior (TAM-TPB), the Unified Theory of Acceptance and Use of Technology (UTAUT) as the core research framework. It identifies Perceived Usefulness (PU), Perceived Risk (PR), Social Influences (SI), and Perceived Behavioral Control (PBC) as key external variables that form the research model for the study. Research data was collected from 536 students from universities in Vietnam. This study uses qualitative and quantitative research methods and tests the research model and hypothesis through Partial least squares structural equation modeling PLS-SEM.

*Findings* – Perceived Usefulness (PU), Social Influences (SI), and Perceived Behavioral Control (PBC) positively affect the decision of university students to create curriculum vitae on online platforms. Meanwhile, Perceived Risk (PR) does not affect it.

*Practical implications* – The study implies that university students need to take advantage of the features of online platforms to increase their chances of getting admission. In addition, businesses need to improve the online platform system and services to attract these talented groups of candidates for employment.

*Originality/value* – The study is a new, independent, creative topic. It does not duplicate any previous research work. Besides, the study provides insight for students on the benefits of using online platforms to create curriculum vitae and promotes the growth of these online platforms in Vietnam.

**Keywords:** Curriculum vitae, CV online, Curriculum vitae on online platforms.

### 1. INTRODUCTION

According to the survey data of the Center for Training Support and Human Resource Supply, Ministry of Education and Training, the report in 2020 summarizes the employment situation of graduates of 220/236 higher education institutions (good students in 2019) shows that the percentage of students without a job accounted for 32%.

Many different factors affect a student's ability to find a job but it is clear that the job market is looking for high-quality graduates who not only possess academic qualifications but also can be competitive and creative. According to Shukran and Saodah (2005), besides self-motivation, CV writing skills are also very important for graduates to approach potential employers. The curriculum vitae provides complete and detailed personal information, education level, qualifications, and experience of students, from which employers consider selecting suitable candidates. Having a scientifically designed, beautiful curriculum vitae, ensuring the form and content will impress the employer to increase the likelihood of being hired. However, a traditional CV does not effectively highlight a candidate's strengths, skills, and achievements. Traditional CVs provide a list of achievements and personal details that are inconsistent with modern employment patterns and career changes (Holmes, 2003).

In today's digitalized era, the development of science and technology has led to a series of new technologies, and new utility products born. They bring breakthroughs, and different benefits compared to

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the traditional conventional form before. That's why many people choose to use technology solutions instead of doing it themselves, including creating CVs - curriculum vitae but created on online platforms. Before the limitations of traditional CVs, the utility side of creating CVs - curriculum vitae on online platforms is even more emphasized. Creating job applications on online platforms will be easy to do and bring many opportunities for students to get admission. The question is what factors can influence a student's decision to create a curriculum vitae on online platforms? Is there a way to improve the use of students with this method of job search? What aspects do site creators need to pay attention to develop this online platform in the long run that will attract users, especially students - who are inherently sensitive and quickly adapt to technology? Currently, to meet the needs of both employers and job seekers, online job search platforms have been born and are growing strongly. According to the education site FPT.education, online job search platforms are like bridges between job seekers and employers. Therefore, it has also become the address that many people come to because of its convenience, speed as well as extremely large reach. There are quite a few job search sites on a large scale, gaining millions of weekly visits and gaining the trust of users. Thus, not waiting for the future, but now online platforms are also expanding the popularity of the website to users, especially students.

However, when searching and referring to previous research papers on creating curriculum vitae on online platforms, the authors found that: for foreign research, there are not many research papers on the issue; for domestic research, research on this issue has not been conducted. That is the reason why the research team chose the topic "Study of factors influencing the decision of university students to create curriculum vitae on online platforms". It can be seen that the research team's topic is new, independent, creative and does not overlap with any previous research. It contributes to providing a theoretical basis and practical basis. The study raises students' awareness of using online platforms to create job applications, thereby promoting the development of these online platforms in Vietnam.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Overview of CVs – curriculum vitae and online curriculum vitae**

#### **2.1.1. Concept of job application**

Curriculum Vitae or CV, is a Latin phrase born in the early 20th century with the meaning "process of life". The Oxford Dictionary (2011) defines a CV as a brief statement of a person's education, qualifications, and previous professional experience, usually sent with a job application. Jaime A. Teixeira da Silva et al (2020) stated that a CV is a curriculum vitae that highlights the professionalism of the writer's career. Accordingly, the curriculum vitae will contain the writer's information to provide relevant information on academic qualifications and achievements to the employer. According to the Wikipedia website, a CV - application form (abbreviated from Curriculum vitae) is a set of documents containing summary documents about yourself, your education, training, and work experience used to apply for a job.

Therefore, a CV will have the function of providing information about the writer's education, qualities, work experience, and achievements, helping readers understand and better understand the writer.

#### **2.1.2. The concept of online job application**

The online curriculum vitae concept and m-CV concept (mobile career) were first presented by a group of UiTM Penang students during the Career Talk seminar on March 19, 2011. It's an online CV presentation using a weblog as a development platform that comes with web and mobile versions.

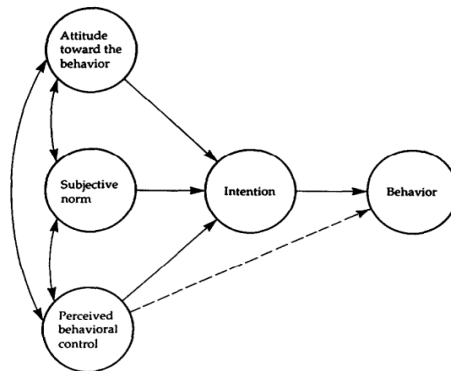
According to the website [vieclamvui.com](http://vieclamvui.com), an online curriculum vitae is understood as a candidate's application file submitted to the employer via email, the online application system on job websites that

the company provides. that company cooperates in recruitment or submits it through the websites of the company or business that the candidate applies for. The online curriculum vitae also provides basic information about the candidate including personal information, qualifications, skills, and work experience.

**2.2. Some theories of the research problem**

**2.2.1. Theory of expected behavior**

Ajzen (1991) who is the author of TPB theory found that “perceived behavioral control” affects people’s intentions, whereby people’s “behavioral intentions” are affected by the factors “attitude”, “subjective norm” and “perceived behavioral control”.



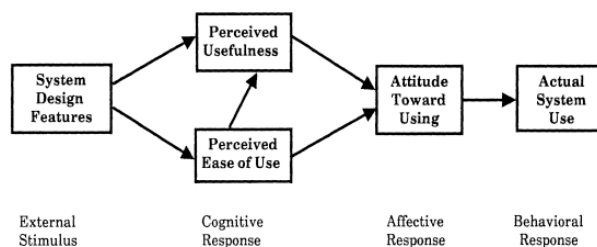
**Figure 2.2.1: The Theory Model of Expected Behavior TPB**

*Source: Ajzen, 1991*

Based on Ajzen’s TPB theory, before a person has a positive attitude and receives support from those around him, that individual will be affected by the act of perceiving the ease or difficulty of doing it. activities on online curriculum vitae creation platforms. If a person can perceive and control behavior easily, it will bring a feeling of comfort and satisfaction. Therefore, individuals will tend to receive and lead to an intention to use online platforms to create curriculum vitae in the future.

**2.2.2. TAM technology acceptance model**

Based on the theory of rational action (TRA), Davis (1989) developed the Technology Acceptance Model (TAM) which is more specifically related to the prediction of the acceptability of an information system.



**Figure 2.2.2: TAM Technology Acceptance Model**

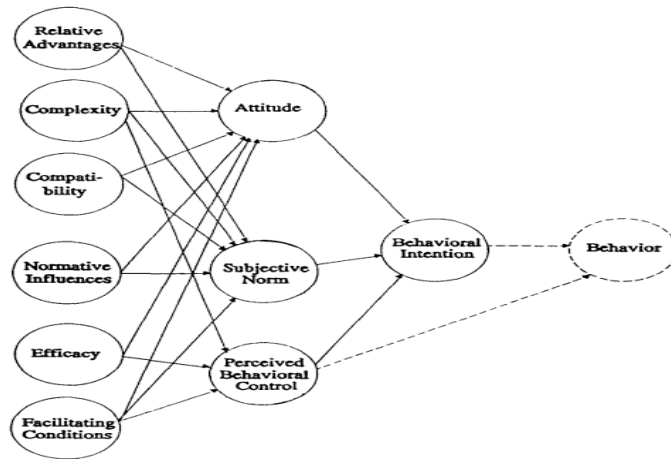
*Source: Davis, 1989*

The purpose of this model is to predict the acceptability of a tool and determine the modifications that must be introduced into the system to make it acceptable to the users. This model shows that the acceptability of an information system is determined by two main factors: perceived usefulness and

perceived ease of use. Thus, the TAM model assumes that the use of technology products is determined by behavioral intentions, but on the other hand, behavioral intentions are determined by each individual’s attitude when using technology products and also by the individual’s perception of the usefulness of the technological product.

**2.2.3. Combined model of TAM and TPB**

Taylor and Todd (1995) have added two main factors to the TAM model, namely subjective norm and perceived behavioral control. According to Taylor and Todd (1995), adding two factors to the TAM technology acceptance model combined with the behavioral intention theory TPB will provide a more appropriate model for the use of information technology products.

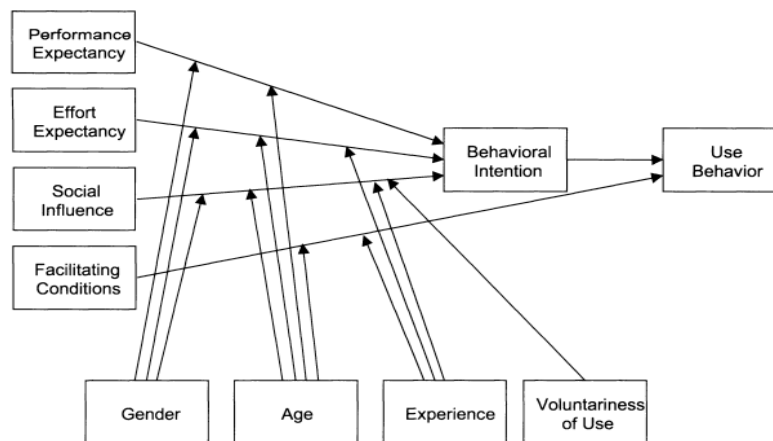


**Figure 2.2.3: Model combining TAM and TPB**

*Source: Taylor and Todd, 1995*

**2.2.4. Unified Model of Technology Acceptance and Use (UTAUT)**

The UTAUT model, also known as the Unified Theory of Acceptance and Use of Technology (UTAUT) model, was developed by Venkatesh et al. (2003) for testing technology acceptance and using a more unified approach. The UTAUT model is relatively new, but it explains 70% of use intent cases, better than any previous model, which can only explain 30% to 45 percent of the time. The UTAUT model has significantly overcome some of the disadvantages of TAM mentioned above.

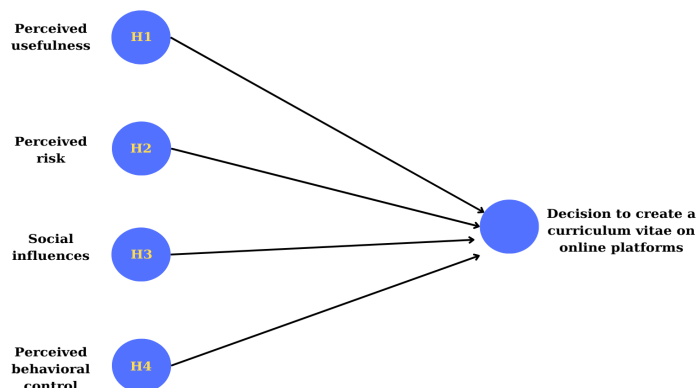


**Figure 2.2.4: Model combining TAM and TPB**

*Source: Taylor and Todd, 1995*

### 2.3. Research model and hypotheses

After conducting a brief study of foreign documents, combining the practice of creating job applications on online platforms in Vietnam, the authors propose a research model with 4 factors: influence students' decisions to create curriculum vitae on online platforms:



**Figure 2.3: Model to measure the influence of factors**

Source: Group of authors

Perceived usefulness is also understood as “*the extent to which a technology is expected to improve the performance of a potential performer*” (Davis et al., 1996). Nyoro et al (2015) consider that perceived usefulness is “*belief that using a particular system will motivate the individual to perform the task*”. Perceived helpfulness can directly influence the decision to use an online platform to create a resume (BY Mah et al., 2011). Perceived usefulness in the study: a person’s feeling that online platforms will bring what they want in creating a profile such as fast, safe, cost-effective while still ensuring detailed and complete information.

**H1: The factor “Perceived usefulness” has a positive impact on the decision to create a curriculum vitae on online platforms.**

Perceived risk has appeared in previous research on customer behavior. It has been proposed as a major factor influencing buyer behavior decisions (Bauer, R.A., 1960). Perceived risk is defined as the combination of uncertainty and severity of associated consequences (Bauer et al., 1967). Litter and Melanthiou (2006) define perceived risk as a consumer’s perception of uncertainty and possible consequences when purchasing a product or service. Perceived risk in the study: feelings of uncertainty, distrust, and fear of revealing personal information, create many different risks.

**H2: The factor “Perceived risk” has a negative impact on the decision to create a curriculum vitae on online platforms.**

Social influence is considered by Venkatesh et al. (2003) as one of the four factors that directly and positively affect the intention of customers to use. Venkatesh et al. (2003) also define social influence as “*the extent to which an individual perceives that others, who are important to him/her believe he or she should use the new system*”. Social influences in the study: include influence from family, friends, relatives, or influencers and think that the individual should use an online platform to create a curriculum vitae.

**H3: The factor “Social influences” has a positive impact on the decision to create a curriculum vitae on online platforms.**

According to Ajzen, I. (1991) and Ajzen, I. (2002), perceived behavioral control is defined as “*Perceived behavioral control is the perception of the easy or difficulty of performing a given behavior and involves*

*control beliefs about the presence of factors that may facilitate or impede the performance*". Perceived behavioral control in the study: the user's perception that he or she has sufficient knowledge, skill, or ability to use an online platform to create a profile.

**H4: The factor "Perceived behavioral control" has a positive impact on the decision to create a curriculum vitae on online platforms.**

### **3. RESEARCH METHODS**

#### **3.1. Research sample**

Sample size: the group of authors chose the number of research samples to be 600 samples, intending to achieve 80% of the original goal, actually achieved 89.33%, and obtained 536 valid samples. Objects of investigation: the subjects of the survey are students of universities; aimed at students who have worked part-time and used an online platform to create a curriculum vitae or have experience. Collect data: primary data of the research team is collected through posting on websites, scientific research groups of universities, student unions, and student groups... Secondary data of the research team: the research was collected through searching, researching, and selecting reputable information sites.

89.3% of students have used an online platform to create a curriculum vitae, and 10.7% of students have never used an online platform to create a curriculum vitae. The sample has 40.7% male students, 59.3% female students. 61% of the sample is third-year students (the highest rate) and 22.8% of fourth-year students. 57.3% students majoring in Business - Management, 9% of students belong to Engineering, 5% students in Architecture - Construction, 7.3% students in Computer - Information Technology, 4.9% in Journalism - Information - Communication, 2.1% students in the Education Division and 14.6% students in other majors. The number of students who used to work part-time accounted for 97.9%. Besides, there are 11 students who have not yet worked part-time but have used the online platform to create curriculum vitae, accounting for 2.1%. 61.8% students work in jobs related to their majors and 36.2% of students do part-time jobs that are not related to their majors. Besides, the number of students who have not worked part-time accounts for 2.1%. 59.3% of the sample is students who have less than 1 year of part-time work, 24.1% of students have part-time jobs from 1-2 years, 11.9% students have part-time jobs from 2-3 years and 4.7 % of students who have worked part-time for more than 3 years. Most of the students use the website "TopCV.vn" to create job applications, accounting for 30.4%; The website "Vieclam24h.vn" has 294 students using it, accounting for 20.6%, and other online platforms. The study was carried out through two phases: qualitative research and quantitative research.

#### **3.2. Qualitative Research**

The research team conducts qualitative research to check the suitability of the theoretical model, and at the same time helps to discover, adjust and supplement the observed variables used to measure the research concepts to ensure the correct scale built following the research theory. Target: Check and screen the independent variables in the research model that the authors have proposed, discover new causes, and at the same time determine the relationship between the independent variable and the dependent variable.

Method: Conduct preliminary interview with 10 students by face-to-face interview with 5 students, interview via the Internet (Video chat) with 5 students (due to geographical distance). The authors compare the views and opinions of the interviewees, then find the similarities and differences and conclude to propose the model. Result: Basically, the group theory model proposed by the authors is suitable.



### 3.3. Quantitative Research

**Table 3.3: Research scale**

Hypothesis		Symbol	The scale	Source
Perceived Usefulness (PU)	1	PU1	Creating profiles on online platforms saves me time	Group of authors
	2	PU2	Creating curriculum vitae on online job search platforms saves me money.	
	3	PU3	Creating a curriculum vitae on online job search platforms keeps me updated with complete and detailed information.	
	4	PU4	The process of creating a curriculum vitae on online job search platforms is clear and easy to understand.	
	5	PU5	I work easily on online job search platforms to create a curriculum vitae.	(Mah et al., 2011), (A Parikh et al., 2021)
	6	PU6	I easily taught myself how to use online job search platforms to create a curriculum vitae.	
Perceived Risk (PR)	1	PR1	Creating a curriculum vitae on online job search platforms caused me to leak personal information.	Group of authors
	2	PR2	Curriculum vitae templates on online job search platforms are not renewed, causing me to overlap with many other candidates.	
	3	PR3	The system of online job search platforms often has technical problems and data loss.	
Social influence (SI)	1	SI1	My family advised me to use online job search platforms to create a curriculum vitae	(A Parikh et al., 2021)
	2	SI2	Friends advised me to use online job search platforms to create a curriculum vitae.	
	3	SI3	People who are reputable to me recommend that I use online job search platforms to create a curriculum vitae.	
	4	SI4	I was intrigued by the advertisements for online job search platforms.	Group of authors
Behavioral Control (PBC)	1	PBC1	I have the necessary knowledge to use online job search platforms to create curriculum vitae.	(A Parikh et al., 2021)
	2	PBC2	I can use online job search platforms to create curriculum vitae.	
	3	PBC3	I have complete control over my use of curriculum vitae creation online job search platforms.	
Decide to use (DU)	1	DU1	Using online job search platforms to create a curriculum vitae is the right decision.	Group of authors
	2	DU2	I will continue to use online job search platforms to create curriculum vitae in the future.	(Mah et al., 2011), (A Parikh et al., 2021)
	3	DU3	I would gladly recommend my acquaintances to use online job search platforms to create curriculum vitae.	Group of authors

Data analysis: After collecting, coding, and cleaning, the data was analyzed by SPSS software version 26 and processed by SmartPLS 4.0 software.

- Descriptive statistics to calculate the mean and standard deviation of the perception of the factors affecting the decision to create a curriculum vitae on online platforms.

- Test the reliability of the scale by Cronbach's Alpha coefficient to assess the reliability and value of the scale.

- Test the difference between the survey groups to assess the difference in the evaluation criteria of the sample groups with different characteristics.

- Data analysis process based on using SmartPLS software in three steps: Data encryption and descriptive statistics; Evaluation of the measurement model; Evaluate structural models.

**4. RESULTS AND DISCUSSION**

**4.1. Results**

**4.1.1 Descriptive statistics of observed variables**

Through the survey, the independent observed variables all have relatively high mean values ranging from 4.37 (SI2) to 5.31 (PU2), proving the large influence of the observed variables on the decision to create student curriculum vitae on online platforms. Besides, the dependent variables show that the majority of students decide to continue using online platforms to create curriculum vitae in the future (Mean value is 5.17 – DU2) and they give that using online platforms to create curriculum vitae is the right decision (DU1) and are happy to recommend acquaintances to use online job search platforms to create curriculum vitae (DU2). This is evidenced by the mean values of 5.13 and 5.07, respectively.

The standard deviation of the observed variables ranges from 1,236 (PU6) to 1.648 (SI1) because the scale used by the authors is a 7-level Likert scale, so with this standard deviation, the value shows the object. The number of answers does not differ much.

**Table 4.1.1: Descriptive statistics of observed variables**

Variable	Mean	Standard Deviation	Variable	Mean	Standard Deviation
PU1	5.2	1.427	SI1	4.37	1.648
PU2	5.31	1.447	SI2	4.99	1.447
PU3	5.23	1.339	SI3	5.07	1.326
PU4	4.97	1.318	SI4	5.12	1.423
PU5	5.16	1.353	PBC1	5.17	1.431
PU6	5.28	1.236	PBC2	5.13	1.499
PR1	4.96	1.474	PBC3	5.21	1.316
PR2	5.11	1.455	DU1	5.13	1.203
PR3	4.82	1.371	DU2	5.17	1.297
			DU3	5.07	1.477

Source: Data processing on SPSS 26.0

**4.1.2. Scale verification results through measurement model evaluation**

*a, Reliability and convergence value of the scale*

Since the latent variables in the research model are reflective, the quality of the observed variables is assessed through the external loading coefficient of the observed variables. This is an index showing the degree of association between the observed variable and the latent variable. The outer loading results show that the scales all meet the requirements greater than 0.7. Therefore, the observed variables are all significant in the model.

**Table 4.1.2: Outer loadings results**

	Behavioral Control	Perceived Usefulness	Decide to use	Perceived Risk	Social influence
PU1		0.88			
PU2		0.925			
PU3		0.83			
PU4		0.899			
PU5		0.906			
PU6		0.874			
PBC1	0.927				
PBC2	0.922				
PBC3	0.894				

	Behavioral Control	Perceived Usefulness	Decide to use	Perceived Risk	Social influence
DU1			0.915		
DU2			0.92		
DU3			0.93		
PR1				0.84	
PR2				0.919	
PR3				0.887	
SI1					0.71
SI2					0.897
SI3					0.905
SI4					0.882

Source: Data processing results from SmartPLS software

The reliability of the scale is assessed based on two main indicators, namely Cronbach's Alpha coefficient and the composite reliability coefficient CR (Composite Reliability). Researchers often prefer to choose the composite reliability CR over Cronbach's Alpha because Cronbach's Alpha coefficient evaluates the lower reliability. According to Henseler et al. (2013), these two coefficients need to reach values greater than 0.6 with exploratory studies and will achieve a good confidence level when these two values reach the threshold of 0.7.

To evaluate convergence, the author relies on the extracted variance index (AVE). According to Hock and Ringle (2010), a scale achieves a convergence value if the AVE is 0.5 or higher. This level of significance means that the average parent latent variable will explain at least 50% of the variation of each child observation.

**Table 4.1.2: Results of evaluating the reliability and convergence value of the scale**

	Cronbach's Alpha	rho_A	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
Perceived Usefulness	0,945	0,947	0,956	0,785
Perceived Risk	0,857	0,866	0,913	0,779
Social influence	0,872	0,889	0,913	0,727
Perceived behavioral control	0.902	0.903	0.939	0.836
Decide to use	0,912	0,916	0,944	0,849

Source: Data processing results from SmartPLS software

The results show that the coefficients of Cronbach's Alpha of all variables in the model are greater than 0.7 and range from (0.857 to 0.945). Composite Reliability is greater than 0.7 and AVE is greater than 0.5, showing that latent variables in the model explain more than 50% of the variance of the scales. Thus, the scales are reliable and convergent.

#### *b. Discriminant value test*

Discriminant value indicates how distinct a structure is when compared to other structures in the model. To test the discriminant value of the variables in the research model, two indexes can be used, namely the square root of AVE proposed by Fornell & Larcker (1981) or the HTMT index proposed by Henseler et al (2015). propose. Fornell & Larcker (1981) suggested that discriminability is guaranteed when the square root of the AVE of each latent variable is higher than all correlations between the latent variables. With the HTMT index, according to Henseler et al. (2015), the discriminant value is established between the structures when the HTMT index is below 0.9, but Kline (2015) applies a more stringent standard threshold of 0. 85.

The Fornell-Larcker index results in the table show that the top value of each column is larger than the other coefficients in the column, that is, the square root of AVE is larger than the correlation between latent variables.

**Table 4.1.3: Fornell-Larcker index results**

	Behavioral Control	Perceived Usefulness	Decide to use	Perceived Risk	Social influence
Behavioral Control	0,914				
Perceived Usefulness	0,798	0,886			
Decide to use	0,795	0,828	0,922		
Perceived Risk	0,664	0,759	0,7	0,882	
Social influence	0,721	0,72	0,759	0,682	0,852

Source: Data processing results from SmartPLS software

The HTMT index of each structure, shown in Table 4.24 is less than 0.9, thus meeting the criteria of Henseler et al. (2015). Thus, it can be concluded that the constructs have discriminant validity.

**Table 4.1.4: HTMT index results in**

	Behavioral Control	Perceived Usefulness	Decide to use	Perceived Risk	Social influence
Behavioral Control					
Perceived Usefulness	0,865				
Decide to use	0,873	0,888			
Perceived Risk	0,751	0,841	0,786		
Social influence	0,808	0,783	0,843	0,789	

Source: Data processing results from SmartPLS software

Thus, after evaluating the measurement model, the observed variables measuring the research factors remain the same as at the beginning.

**4.1.3. Results of model testing and research hypotheses through structural model evaluation**

To evaluate and test the structural model, the authors performed Bootstrap estimation with a magnification factor of 5000 samples with the significance level of the test at 5%. The bootstrap technique in PLS-SEM is a repeated random sampling method to help test research hypotheses.

**4.1.3.1. Multicollinear Detection**

Multicollinearity in the model will be checked through the VIF index. Because the latent variable in the model is reflective, the result of the VIF coefficient will be displayed in the Inner VIF Values result in SmartPLS software. According to Hair et al. (2016), a VIF value < 5.0 means no multicollinearity will occur.

**Table 4.1.3.1: Multicollinearity test results in**

	Behavioral Control	Perceived Usefulness	Decide to use	Perceived Risk	Social influence
Behavioral Control			3,146		
Perceived Usefulness			3,849		
Decide to use					
Perceived Risk			2,594		
Social influence			2,547		

Source: Data processing results from SmartPLS software

The results of the VIF value in Table 6.6 show that the VIF coefficients are all < 5.0, so the model does not have the phenomenon of multicollinearity between the latent variables and the test of the correlation between the guaranteed variables. guarantee the reliability of the study. Thus, all latent variables are eligible to perform the next analysis.

**4.1.3.2. Test model and research hypothesis**

To test the research hypotheses, the indexes used include Path Coefficients, P-Value, T-Value, and f squared-test criteria to confirm or accept the research hypothesis at 95% confidence level, T-Value > 1.65, P-Value < 0.05. The coefficient f2 will show the degree of influence of the independent variable on the

dependent variable. Cohen (1988) proposed an index table  $f^2$  to evaluate the importance of independent variables as follows:  $f^2 < 0.02$  (the level of impact is extremely small);  $0.02 \leq f^2 < 0.15$  (small impact level);  $0.15 \leq f^2 < 0.35$  (medium impact);  $f^2 \geq 0.35$  (high impact).

**Table 4.1.3.2: Results of testing the research hypotheses**

	Cronbach's Alpha	rho_A	Composite Reliability (rho_c)	Average Variance Extracted (AVE)
Perceived Usefulness	0,945	0,947	0,956	0,785
Perceived Risk	0,857	0,866	0,913	0,779
Social influence	0,872	0,889	0,913	0,727
Behavioral Control	0.902	0.903	0.939	0.836
Decide to use	0,912	0,916	0,944	0,849

Source: Data processing results from Smart PLS software

The values of the hypotheses H1, H3, and H4 have T-Value  $> 1.65$ , P-Value  $< 0.05$ , so in this model the hypothesis H1; Hypothesis H3, hypothesis H4 is accepted. Besides, because hypothesis H2 has T-Value  $< 1.65$ , P-Value  $> 0.05$ , this hypothesis is not statistically significant, so hypothesis H2: “perceived risk has an impact. negatively on the decision to create curriculum vitae on online platforms” was rejected.

Considering the coefficient  $f^2$  of the hypotheses H1, H3, and H4, we find that: The factor “Perceived Usefulness” has a great positive impact on the decision to create a curriculum vitae on online platforms with the coefficient  $f^2$  being 0.177. The remaining factors influence at a small level according to Cohen’s (1988) evaluation rule and in the order of “Social influence” ( $f^2$  is 0.099), “Perceived behavioral control” ( $f^2$  ). is 0.093).

The coefficient of determination  $R^2$ :  $R^2$  shows how much the independent variables in the model explained the variation of the dependent variable. The measurement results of the R-square adjusted coefficient and adjusted  $R^2$  coefficient are shown in Table.

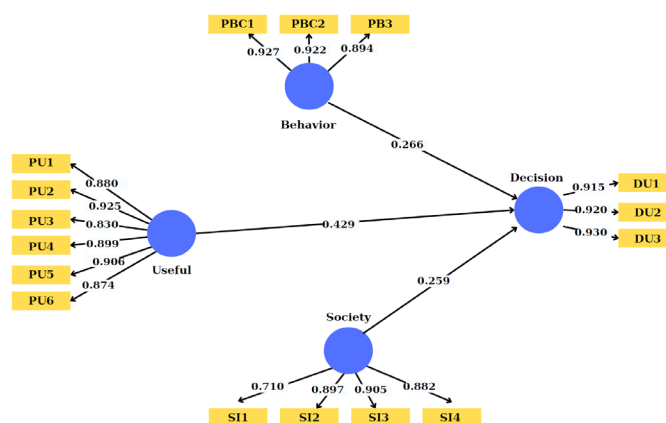
**Table 4.1.3.3: Coefficient of determination R-square adjusted**

	R-square	R-square adjusted
DU	0,765	0,763

Source: Data processing results from SmartPLS software

From Table 4.1.3.2.2 it can be seen that the adjusted  $R^2$  value of the dependent variable DU is 0.763. This shows the strong explanatory power of the model. Thus, the constitutive factors explained 76.3% of the variation in the decision to create an online curriculum vitae.

**Figure 4.1.3: Overall structural model**



Source: Data processing results from SmartPLS software

## 4.2. Discussion

The factor “Perceived Usefulness” has the strongest influence on students’ decision to create curriculum vitae on online job search platforms. Students feel that creating curriculum vitae on online platforms saves time and money compared to creating a traditional curriculum vitae. They believe that creating curriculum vitae on online job search platforms helps them update complete and detailed information. The process of creating a resume on online job search platforms is clear and easy to understand. They can easily manipulate and teach themselves how to use online job search platforms to create curriculum vitae. This conclusion is also mentioned in the study of BY Mah et al (2011). “*The study notably found that students’ perceived usefulness may have directly effects on their intention to adopt m-CV. It showed that students’ perceived ease of use might be mediated by their perceived usefulness, which had considerable indirect effects on their intention to use m-CV.*” (BY Mah et al, 2011).

Perceived Behavioral Control is the second influential factor on students’ decision to create curriculum vitae on online job search platforms. Students have complete control over using the online resume platform when equipped with enough knowledge. Therefore, they will decide to use it to create curriculum vitae.

The factor “Social Influence” positively influences students’ decision to create curriculum vitae on online job search platforms. The fact that relatives, friends and advertisements about online platforms will encourage them to use online platforms to create curriculum vitae.

The factor “Perceived Risk” does not influence the decision to create a resume on online platforms. Online platforms causes negligible damage and the frequency is so small that student can be resolved and accepted by themselves. This reason is also mentioned in the study of Yoon Kin Tong et al (2009). Research suggests that job seekers are generally aware of these risks but still use online recruitment sites because this method’s ease of use, usefulness, and speed of posting offers many advantages over other methods.

## 4.3. Recommendations

### 4.3.1. Recommendations for individual students to use online platforms to create curriculum vitae

#### 4.3.1.1. Make the most of online platforms to create curriculum vitae

Online platforms for creating curriculum vitae bring many benefits and conveniences, helping students save money because they don’t have to buy paper curriculum vitae, and do not have to buy additional curriculum vitae. else if spelled incorrectly. Curriculum vitae on online platforms allow students to freely modify and design their curriculum vitae without limits, without fear of making mistakes.

The operation of creating a curriculum vitae on online platforms is also simple and easy to understand, making it easier for students to work on online platforms to create a curriculum vitae and create a curriculum vitae by themselves. apply for a job without difficulty.

Online platforms provide ready-made curriculum vitae templates for students to choose and design to their liking, so they don’t need to spend a lot of time and effort to think of ideas. In addition, students can reuse curriculum vitae on these online platforms to submit in multiple places. Therefore, applying for jobs on online platforms helps students have more opportunities to apply at many different companies and businesses, helping to increase their chances of being recruited.

Students should know how to make the most of the online platform’s features to create a curriculum vitae that best suits them, and seize the opportunity to apply for the job of their dreams.

#### 4.3.1.2. Improve knowledge and necessary conditions for creating curriculum vitae on online platforms

To facilitate the creation of job applications on online platforms, students should constantly improve their knowledge and necessary conditions. Knowledge here is knowledge about how to use that online

platform, how to create a satisfactory curriculum vitae, how to use that platform... As students hone their skills The above knowledge and conditions will be convenient in creating your profile easily to avoid confusion or technical problems in creating your profile.

#### *4.3.1.3. Update features and curriculum vitae templates regularly*

Regular updates of features and curriculum vitae templates help students enjoy incentives and benefits from the fastest online platform. Update useful features that automatically correct spelling errors or automatically suggest necessary information items for your profile, compatible with different devices, without errors in fonts, images, etc. This feature will help students complete their online curriculum vitae professionally and perfectly. In addition, students need to update the curriculum vitae templates regularly to avoid duplicates with other candidates as well as have more diverse choices. Depending on the nature of the job, needs, and interests, students can choose the appropriate curriculum vitae template. As a result, students can make an impression on employers through these professional curriculum vitae templates.

#### **4.3.2. Recommendations for businesses providing online platforms**

##### *4.3.2.1. Enhance the sense of usefulness*

According to the research results, “Perceived Usefulness” is the main factor that has the strongest impact on students’ decision to create a curriculum vitae on online platforms today (Beta = 0.4). This is easy to see because today’s online platforms always focus on increasing the utility for customers to attract users, proving that the greater the benefits that students perceive, the more they tend to use. use it. Therefore, businesses providing online platforms must focus on solutions that increase the usefulness and ease of use for their online platforms.

First, in order for students to save time and money when creating a curriculum vitae, the online platform provider should integrate the website with the function of automatically searching and recommending curriculum vitae templates for students. suitable for an affordable cost. The online platform has an eye-catching website interface design, the headings are arranged in a scientific way, and the operations are simple. At the same time, the online platform also needs to regularly update the search questions and send the most feedback to gather at the help center to help users choose the content they need without spending a lot of time searching.

Secondly, to bring the highest efficiency and convenience to students, the online platform needs to catch up with the trend of the times and update the modern, youthful, diverse and appropriate curriculum vitae templates. professions to avoid duplication, creating comfortable conditions for students to choose profile designs.

Businesses should optimize the interface of the online platform, and design a clear and easy-to-operate website, customers do not need to take too many steps to search or design a profile, and the page load speed is fast. It is an important factor in increasing the perception of ease of use.

Long-term investment in modern technology systems, such as building high-security technology systems, careful risk contingency plans, ensuring online information is safe, and minimizing risks. security risks, helping customers have confidence and peace of mind when using to create job applications on their online platform.

Regularly review and evaluate the safety of the system, proactively detect security holes, and fix them. All of these issues need to be widely communicated to target customers, thereby creating more peace of mind when participating in creating job applications on the online platform.

#### 4.3.2.2. Promoting social influence

Research results show that social influence has an impact on students' decision to create curriculum vitae on online platforms. Thus, friends, family, and reputable people support an individual who creates a curriculum vitae on an online platform or is attracted to advertisements about the online platform that route or not will affect the psychology and behavior of the individual who decides whether to create a curriculum vitae on that online platform or not. Therefore, to take advantage of and promote this feature, businesses providing online platforms need:

*Firstly*, Promote marketing through social media channels. This is an effective marketing channel for businesses. Media products that have impressed customers make them remember. Therefore, businesses also need to continue to maintain their image on media such as Youtube, Tiktok, Facebook, and Instagram... These tools help businesses reach more target customers, thereby helping businesses reach more target customers. help increase traffic to your website.

*Secondly*, Enterprises need to promote brand recognition to students using communication: using led poster screens at schools to promote to users.

*Thirdly*, businesses should promote marketing through influencers (Influencer marketing). Influencer marketing is growing strongly, making it easier to promote products and services and reach users in a natural and friendly way. Using this form of communication is one of the effective ways for businesses to connect with a large number of users: students. However, to be suitable for students, businesses also need to consider choosing the right influencers because each influencer focuses on exploiting different content, targeting people who are interested in the field. while following them.

*Finally*, businesses need to pay attention to improving user experience, especially students: listening and absorbing user opinions through usage surveys... to promptly fix and improve their online platforms. The reason is that students' decisions to create curriculum vitae on online platforms are also influenced by friends who have used them before. So if they have a good experience, they will also refer more users to the business, and if they have a bad experience using it, they will not recommend that online platform to others. This is also known as "word of mouth" advertising.

#### 4.3.3 Limitations of the study and directions for further research

Although the research has made certain contributions in theory as well as practice, this is also a new topic for students, leading to certain limitations:

Firstly, the number of samples collected is only 536 samples according to the convenient sampling method in some provinces/cities directly under the Central Government. Therefore, it is not possible to represent all Vietnamese students. Therefore, the generality is not high.

Secondly, the proposed research model includes only 4 factors that affect students' decision to create job applications on online platforms today. There may be other factors that have not been mentioned.

Thirdly, the survey respondents are only on the demand side (students) but not on the supply side (providers) of online platforms.

Finally, the study period was conducted in a short period (within 3 months from September 20, 2022, to February 10, 2023).

The above limitations are suggestions for future research directions.

## 5. CONCLUSION

The study has achieved success in building a model "Factors influencing the decision to create curriculum vitae on online platforms" and has achieved outstanding points. Research has shown important



groups of variables that directly affect students' decisions to create curriculum vitae on online platforms. According to the research results, the factors that have a positive effect in decreasing order of magnitude are perceived usefulness (standardized beta is 0.4), and perceived behavioral control (standardized beta is 0.263). ), social influences (normalized beta is 0.244)

The research model that the authors built with the hypothesis: The factor “perceived risk” negatively influence the decision to create a curriculum vitae on online platforms is rejected. To explain the above problem, the research team conducted a small interview including 5 people, through the answers, most of the students said that the risk that creating a curriculum vitae on the Internet Online platforms cause negligible damage and the frequency is so small that they can be resolved and accepted by themselves.

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## THE IMPACT OF PERCEIVED VALUE, SOCIAL INFLUENCE AND SITUATIONAL INFLUENCE ON PERFORMANCE EXPECTANCY AND E-BOOK USER SATISFACTION: THE CASE IN HANOI

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**ABSTRACT:** *In the context of strong digital transformation today, increasing the satisfaction of e-book readers is essential to enhance reading behavior and improve the effectiveness of e-book usage. Based on the Expectation Confirmation Model (ECM) and the Theory of Planned Behavior (TPB), this study clarifies the central role of efficiency expectations in user satisfaction with e-books. Data collected through a survey of 555 university students in Hanoi was processed using Smart-PLS 4.0 software. The results have confirmed the central role of efficiency expectation when this factor has a direct and significant impact on user satisfaction with e-books. In addition, all factors such as “perceived value”, “social influence”, and “situational influences” have a direct impact on the reader’s expectations of e-book effectiveness. Some implications of this study are discussed for increasing user satisfaction with e-books.*

*Keywords: e-books, perceived value, reading performance expectancy, satisfaction.*

### 1. INTRODUCTION

Currently, Vietnamese reading culture is receiving more attention and interest than ever before. The development of technology and the strong trend of digital transformation have led to the emergence of digital products, especially e-book readers. Besides, the evolution of the Covid-19 pandemic in the past 3 years has led to a change in consumption behavior. As a result, reading e-books is being mentioned as a trend in society. In particular, Vietnam has a young population structure that loves technology, is eager to learn and has need to update new trends; therefore, e-book is a modern and convenient reading method, suitable for the digital age. The Vietnamese e-book market has experienced more than 10 years of development with some initial successes. As of 2021, Vietnam has had 2,300 electronic publications in circulation. According to the report of the Waka e-book application, the average daily reading time of e-books by Waka readers has continuously increased and is currently at around 30 minutes per person per day. Vietnamese readers are also increasingly willing to pay more for e-books. Specifically, on the Waka platform, in 2017, three out of ten readers were willing to pay more than 100,000 VND per year for e-books. These are positive numbers, opening up hopes that the number of e-book users in Vietnam will continue to increase and the e-book market will develop continuously to better meet the growing trend of reading culture.

According to the General Statistics Office (2021), Vietnamese education system has 242 universities with a total of approximately 1,906,000 undergraduate students. With such a large scale, the demand for using electronic books such as textbooks and learning materials for research is very high.

As a digital product, e-books offer many undeniable advantages over conventional printed books in terms of mobility, convenience, visual appeal, interactivity, accessibility and low cost (Verkijika, 2019; Tosun, 2014). Therefore, e-books tend to be increasingly used by many countries, especially in education

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(Wang & Bai, 2016; Alhammad & Ku, 2019). Furthermore, the explosion of information technology and the context of the Covid-19 pandemic have led to a change in learning and researching at universities from traditional to online methods, from using paper books to using e-books. In this context, universities have built diverse e-learning resources to serve the purposes of teaching, learning and research for lecturers as well as students with the motto of being accessible anytime, anywhere. E-learning materials bring vividness, attractiveness, convenience and innovation in teaching and learning methods. These affirm the importance of researching the factors influencing the behavior of students in using e-books as well as contributing to enhance the reading and learning effectiveness of students, while opening up a direction for Vietnamese universities to replace traditional books in the future.

This study investigates the factors affecting the use of e-books among university students, with a focus on Hanoi. The research model is developed based on the ECM and TPB with hypotheses about the positive impact of three factors (social influence, perceived value, situational influences) on reading performance expectancy and the relationships between reading performance expectancy and satisfaction of e-readers.

## **2. THEORETICAL FRAMEWORK**

### **2.1. E-books**

Electronic book (abbreviated as e-book or eBook), is a digital version of a traditional book. According to Tosun (2014), an e-book includes both hardware (e-book reader) and software called rich text features that allow readers to perform tasks such as marking up text and taking notes, just like with traditional books. E-books can be accessed from a variety of devices, including dedicated e-book readers (e.g., Kindle, Kobo, Nook, etc.), desktop computers, laptops, smartphones, or any other screen-navigable device.

E-books simulate the basic features of traditional books in an electronic format. The attributes of traditional books can be better provided in the digital environment with features such as searching, hyperlinking, and annotations (Vassiliou & Rowley, 2008). E-books can be read on dedicated e-readers or on any screen-enabled computing device, including desktop computers, laptops, tablets, smartphones, and pocket PCs.

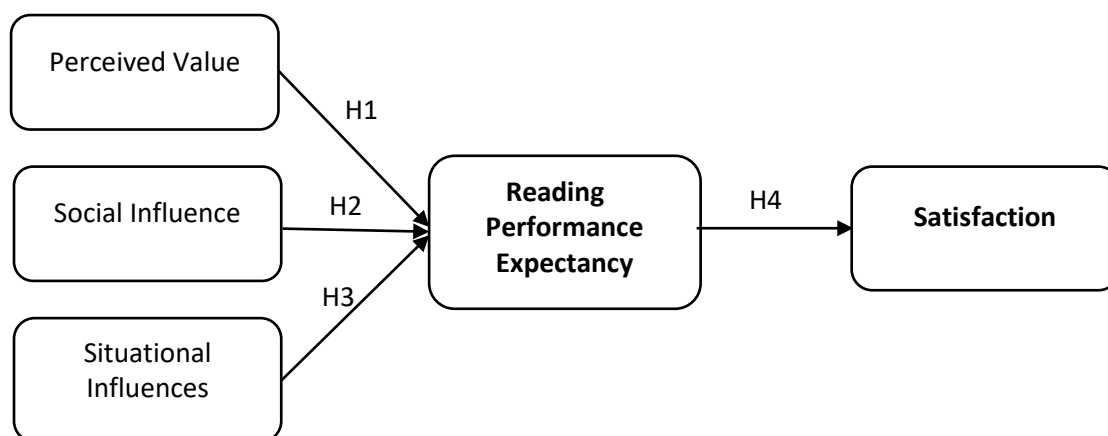
### **2.2. Expectation Confirmation Model (ECM) and Theory of Planned Behavior (TPB)**

Bhattacharjee (2001) proposed the Expectation-Confirmation Model (ECM) based on the Expectation-Confirmation Theory (ECT) in marketing and the perceived usefulness of the Technology Acceptance Model (TAM) in information system/ information technology (IS/IT). ECT emphasizes that customer experience plays an important role in performing purchasing behaviors by explaining the relationship between expectations, satisfaction, disconfirmation, attitude, and intention (Bhattacharjee, 2001). The “Perceived usefulness” factor in the TAM model is an important predictor of the intention to use IS/IT (Davis, 1989). In ECM, “Expectation” refers to the degree to which users’ expectations are satisfied, based on their experience of using IS/IT; “Perceived usefulness” is the extent to which users believe that using IS/IT is beneficial; “Satisfaction” is a positive emotional state resulting from the evaluation of technology usage, and “Continuance Intention” refers to the intention to repurchase technology or use the service continuously (Bhattacharjee, 2001). If expectation is met through the use of IS/IT, users tend to be satisfied and perceive the IS/IT as useful. In turn, they tend to keep using the technology (Bhattacharjee, 2001).

The Theory of Planned Behavior (TPB, proposed by Ajzen, 1991) was developed by the earlier Theory of Reasoned Action (TRA, proposed by Ajzen & Fishbein, 1980) that is applicable and predictive across a wide range of contexts. TPB and TRA can be applied to voluntary behaviors and are supported by rational intentions and thoughts. Additionally, these theories have been widely used by researchers in various fields such as marketing, psychology, management, medicine, and finance. Based on the results of TRA, Ajzen (1991)

introduced the Theory of Planned Behavior (TPB), which has many advantages over the previous model. Essentially, TPB extends TRA by adding “Perceived Behavioral Control” (PBC) in addition to “Attitude” and “Subjective norm”, which is the reference opinions of those around. TPB, with the addition of PBC, has demonstrated its value and effectiveness in a range of psychological studies related to human behavior.

### 3. RESEARCH MODEL AND HYPOTHESIS DEVELOPMENT



**Figure 1. Proposed model**

Figure 1 illustrates the proposed model of this study, which was developed based on the ECM and the TPB. In this research model, the independent variables include: Perceived value, Social influence, and Situational influences. Among them, “Situational influences” is considered as an independent variable because there are many comments that the impact and context of the Covid pandemic in the period of 2019-2022 have promoted the use of e-books by readers stronger than in previous years. The intermediate variable in the research model is “Reading performance expectancy” of e-readers, also known as the variable “Performance Expectancy” (Maduku, 2015) or “Perceived usefulness” in the ECM model of Bhattacharjee (2001). In the following section, we review relevant literature and propose four hypotheses.

#### 3.1. Relationship between Perceived value and Reading performance expectancy

Perceived value can be determined by comparing the effective benefit of a purchase with the sacrifices required to make the purchase (Kim et al., 2007). Performance expectancy is the expectation of performance results, defined as the degree to which an individual believes that using the IS/IT will enable them to achieve returns in job performance (Venkatesh et al., 2003). Perceived value represents an overall estimate of the utility of a product or service (Zeithaml, 1988). From the perspective of consumer’s choice, consumers estimate the value of a product or service by considering all factors of benefits and costs involved (Constantiou & Mahnke, 2010). Researchers have found that, in shopping contexts such as online music services (Chu & Lu, 2007), social networking sites (Lu & Hsiao, 2010) and online auction sites (Lu & Hsiao, 2010), perceived value has a significant and positive impact on payment intention. From the above studies, it can be assumed that when e-readers perceive the net benefit from reading e-books is high, they are likely to maintain a positive attitude towards this product. Based on the above argument, the first hypothesis was proposed:

*H1: Perceived value has a positive impact on the reading performance expectancy.*

#### 3.2. Relationship between social influence and reading performance expectancy

Social influence is a fact of daily life. Social influence is enormous, encompassing everything from mere existence and imitation effects to more (Dahl, 2013). Forsyth (2013) defined social impact as “an

interpersonal process that changes human emotions, thoughts, or behavior”. Pratkanis (2007) assumed that social influence is essentially non-coercive. Social impact includes how individuals adjust their behavior to meet the needs of the social environment. Deutsch & Gerard (1955) described two psychological needs that lead people to obey the expectations of others. These include the need for correctness (information society influence) and the need to be liked (normative society influence). According to Venkatesh et al (2012), the factor “subjective norm” in the TPB model can be understood as the variable “Social influence” in the UTAUT model. Many previous studies have has proven that there is a stronger association between social influence and intention to use e-book (Maduku, 2015; Hsu et al., 2017; Okocha, 2019). Jin (2014) has shown that subjective norm impact significantly on e-book users’ perceived usefulness. In this study, we argue that: due to the influence of people’s information and expectations about e-books, readers’ expectations of e-books may increase. Therefore, this study proposed the following hypothesis:

*H2: Social influence has a positive impact on the reading performance expectancy.*

### **3.3. Relationship between situational influence and reading performance expectancy**

Situational factors, according to Ross & Robertson (2003), contain “all factors that do not relate to the decision-maker as an individual (e.g., personality and physical characteristics) or to the decision alternatives”, but play an essential role in shaping and strengthening online purchasing motivations (Hand et al., 2009). Situational factors include physical factors such as the purchase location, layout, music, lighting, etc. In addition, some other factors, such as social situation, time context, the reason for purchase, and consumer mood, also influence consumers’ buying behavior. Such information is crucial in formulating marketing strategies (Kotler, 2000) and retail planning (Levy & Weitz, 1992).

The COVID-19 pandemic can be regarded as an important situational factor affecting user behavior in the context of online consumption (Nguyen et al., 2020). We argue that: in the context of the COVID-19 pandemic, when people have to limit travel and face-to-face contact, reading e-books has almost become a newly created habit; increasing users’ expectations of e-reading performance for their life as well as their learning in the new context. Thus, we proposed the following:

*H3: The effect of the situation has a positive impact on the reading performance expectancy.*

### **3.4. Relationship between reading performance expectancy and e-book readers’ satisfaction**

The common feature of many theoretical models related to technology user behavior (such as TAM, UTAUT, DIT, etc.) is that IS/IT user behavior is strongly influenced by factors related to the benefits brought by new technologies. Cooper (2019) also argued that one of the drivers for the success of a new product is its unique superiority, which means it must provide unique benefits and propose a convincing value to customers and/or users. In this study, the benefits that e-books bring to readers are understood in terms of improving the efficiency of professional work (the effectiveness of reading and learning for learners) and other benefits of e-books to readers (more useful information in life) (Lee, 2013; Jin, 2014). According to Bhattacharjee (2001), perceived usefulness has a significant and consistent impact on attitude in both the pre-adoption and post-adoption of IS/IT. Perceived usefulness has been shown to have a direct and positive impact on reader satisfaction (Jin, 2014; Joo et al., 2017; Verkijika, 2019). Therefore, we hypothesize the following:

*H4: Reading performance expectancy has a positive effect on e-book readers’ satisfaction.*

## **4. RESEARCH METHODOLOGY**

### **4.1. Developing measurement items and questionnaire**

The scales (items) in this paper are adopted and adapted from previous studies (Appendix 1). In which, the items of the variable “Situational influence” are inherited from Nguyen et al. (2020); the items of the

variable “Social influence” are inherited from Jin (2014); the antecedents of “Perceived value” are adapted from Hsiao & Chen (2017); the items of “Reading performance expectancy (RP)” are adapted from Lee (2013) and Jin (2014); the items of “Satisfaction” were adopted from Jin (2014).

To evaluate the model and test the research hypotheses, a survey method was implemented to collect primary data from the survey subjects who are students studying at universities in Hanoi.

As of the end of June 2022, there were 2,835 schools with more than 2.2 million students in Hanoi, including 120 universities and colleges belonging to ministries with nearly 1 million students (Xuan, 2022). Hence, in this study, we used non-probability sampling method, whereby, we conduct a student survey focused on 7 large-scale higher education institutions, including: Thuongmai University, Academy of Finance, National Economics University, Foreign Trade University, Hanoi University of Industry, ThuyLoi University, Posts and Telecommunications Institute of Technology. We exclusively questioned students who have been using e-books for the goal of examining reasons resulting in satisfaction of e-book (post-adoption stage) as this target group has had specific experience evaluating the usage of e-books.

Based on the initial scales, a questionnaire was set up, then a pre-test was carried out to obtain feedback on the questionnaire’s content and translation validity. As a result, a complete questionnaire was established. The questionnaire is organized as three parts. Firstly, we used the question “Are you using any sorts of e-book?” to weed out respondents who have not used e-books yet. Part 1 provided broad information about the behavior of using e-books. Part 2 covered the rationale for using e-books. Personal information about the respondents such as gender, school, and year of study, was included in part 3.

#### 4.2. Survey and data analysis

Both direct and online methods were used in this study. A direct questionnaire was delivered to target respondents with the support of faculty assistants, academic advisors, and instructors. An online survey was conducted by emailing and submitting Google form links. After 2 months, we received 112 responses via the link and 582 votes directly. After removing the invalid votes, 555 valid votes were obtained. This sample size exceeded Hoyle’s (1995) recommendation on the minimum size to ensure the reliability of the analytical results.

Table 2 presents some basic descriptive statistics regarding the respondents. Among them, 46.5 percent were male, 53.5 percent of the 555 respondents were female, and they came from 7 Vietnam’s higher education institutions. Third-year students made up the majority with 50.3% of the group; the remaining participants were 1<sup>st</sup> year (15.1%), 2<sup>nd</sup> year (20.5%), and 4<sup>th</sup> year (14.1 %), respectively.

**Table 2. Profile of sample respondents**

	<b>Profile category</b>	<b>Frequency</b>	<b>Percentage (%)</b>
Gender	Male	258	46.5
	Female	297	53.5
University	Thuongmai University	134	24.1
	National Economics University	79	14.2
	Hanoi University of Industry	68	12.3
	Foreign Trade University	76	13.7
	Academy of Finance	87	15.7
	Posts and Telecommunications Institute of Technology	48	8.6
	ThuyLoi University	63	11.4
University year	First-year student	84	15.1
	Second-year student	114	20.5
	Third-year student	279	50.3
	Fourth-year student	78	14.1

This study uses the partial least squares (PLS)-based structural equation modeling technique (SEM), which is more suitable for predicting and discovering structural relationships (Hair et al., 2016). Accordingly, the data will be analyzed in two stages: First, measurement model analysis is evaluated to consider the relationship between the latent variables and determine the reliability of the scale, calculate the validity of the scale, convergent value as well as the discrimination of the variables (Hair et al., 2016). Second, analyze the structural model to test the hypotheses in the research model.

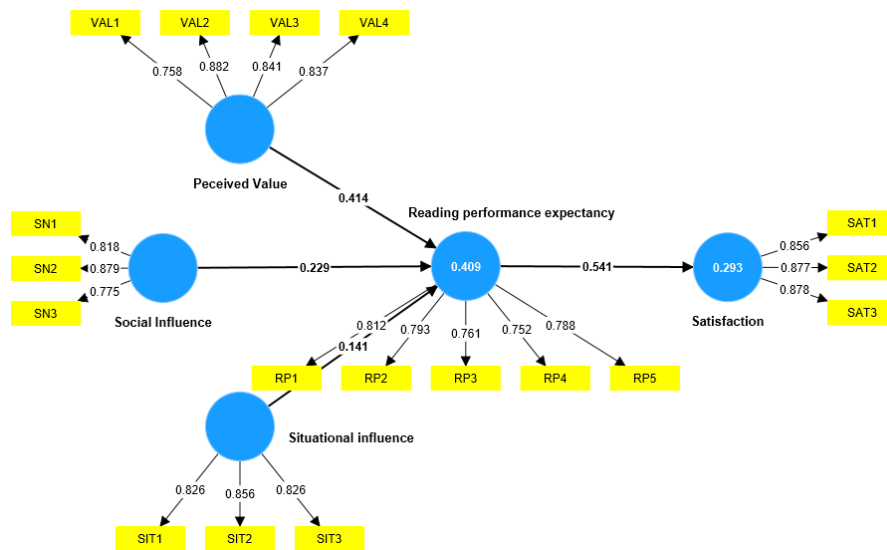
**5. RESULTS AND DISCUSSION**

**5.1. Results**

**5.1.1. Measurement model**

*Reliability and convergent validity:*

The process of evaluating the measurement model was carried out using statistical criteria, including composite reliability (CR) and Cronbach’s alpha to assess the internal consistency of each variable’s scales (Henseler et al., 2015; Hair et al., 2016). Outer loadings and average variance extracted (AVE) to assess the convergent validity (Hair & colleagues, 2016); the HTMT ratio to assess the discriminant validity (Henseler et al., 2015).



**Figure 3. Measurement model**

The results from table 3 show that the outer loading values of all measurement scales in the research model are over 0.7; the Cronbach’s alpha coefficients of all variables in the research model are between the ranges (0.765-0.850); the CR coefficients of all variables are > 0.7; and the AVE indices are > 0.5. This means that each latent variable in the model explains more than 50% of the variance of the measurement scales (Hair & colleagues, 2016). Therefore, the measurement model has qualified reliability and convergent validity (Hair et al., 2016).

**Table 3. Outer loadings, Cronbach alpha, CR and AVE**

Variable	Outer loadings	Cronbach Alpha	CR	AVE
Reading performance expectancy (RP)		0.840	0.887	0.611
RP1	0.812			
RP2	0.793			
RP3	0.761			
RP4	0.752			



RP5	0.788			
Satisfaction (SAT)		0.840	0.903	0.757
SAT1	0.856			
SAT2	0.877			
SAT3	0.878			
Situational influence (SIT)		0.786	0.875	0.699
SIT1	0.826			
SIT2	0.856			
SIT3	0.826			
Social influence (SN)		0.765	0.865	0.681
SN1	0.818			
SN2	0.879			
SN3	0.775			
Perceived value (VAL)		0.850	0.899	0.690
VAL1	0.758			
VAL2	0.882			
VAL3	0.841			
VAL4	0.837			

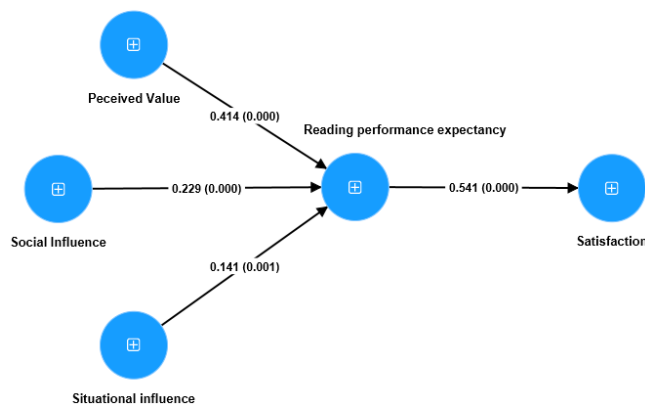
*Discriminant validity:*

The hetrotrait–monotrait (HTMT) ratio is used to assess the discriminant validity of the constructs in this investigation (Henseler et al., 2015). Accordingly, the HTMT value should be less than 0.85 (Henseler et al., 2015). The results present in Table 4 show that all the HTMT values were below the threshold value of 0.85, thus, the discriminant validity of this research model is established (Kline, 2015).

**Table 4. Discriminant validity though HTMT**

	Perceived value	Reading performance expectancy	Satisfaction	Situational influence
Reading performance expectancy	0.679			
Satisfaction	0.641	0.638		
Situational influence	0.498	0.497	0.521	
Social influence	0.584	0.602	0.552	0.527

**5.1.2. Structural model**



**Figure 4. Structure model**

The structural model was evaluated through tests of multi-collinearity (VIF), path coefficients, effect size ( $f^2$ ), coefficient of determination ( $R^2$ ), and hypothesis testing (Hair et al., 2016). As shown in Table 5, all constructs had a VIF value of less than 5 (Hair et al., 2016), indicating no multicollinearity among the variables as shown in the results of Table 6.

**Table 5. Results of multicollinearity detection (VIF)**

	Reading performance expectancy	Satisfaction
Perceived value	1.546	
Reading performance expectancy		1.285
Situational influence	1.442	
Social influence	1.475	

To evaluate the model as well as test the research hypotheses, the path coefficient values for latent variables, T-Value, P-Value, and confidence interval (CI), and  $R^2$  are used. The findings of the structural model assessment and hypothesis testing are presented in Table 6. All four hypotheses H1, H2, H3, and H4 are accepted with a P-value  $<0.05$  and T-Value  $>1.65$ . This means that all the factors, “Perceived value” “Social influence” and “Situational influence” have direct impact on “Reading performance expectancy” (hypotheses H1 to H3). Among them, perceived value has the strongest impact on readers’ expectations about e-books ( $\beta=0.414$ ), followed by social influence ( $\beta=0.229$ ), and situational influence ( $\beta=0.141$ ). In turn, reading performance expectancy has a direct and significant impact on e-readers’ satisfaction with  $\beta=0.541$  (H4).

**Table 6. Hypotheses testing**

	Original sample	Standard deviation	T statistics	P values	VIF	Confidence interval		Results
						5%	95%	
H1: VAL -> RP	0.414	0.049	8.522	0.000	1.395	0.314	0.503	Accepted
H2: SN -> RP	0.229	0.046	4.998	0.000	1.395	0.137	0.318	Accepted
H3: SIT -> RP	0.141	0.040	3.48	0.001	1.300	0.063	0.221	Accepted
H4: RP -> SAT	0.541	0.032	16.846	0.000	1.000	0.473	0.599	Accepted

$R^2$  value is evaluated for all endogenous variables in the model. The coefficient of determination ( $R^2$ ) reveals the extent to which the variation of the endogenous variable is explained by the exogenous variables (Hair et al, 2016). Table 7 reports the coefficient of determination ( $R^2$ ) reaching 0.409 and 0.293. It means that three (03) independent variables (perceived value, social influence, situational influence) explained 40.9% of “Reading performance expectancy” and the variable “Reading performance expectancy” explained 29.3% of e-readers’ satisfaction.

**Table 7. Coefficient of determination ( $R^2$ )**

	$R^2$	Adj. $R^2$
Reading performance expectancy	0.409	0.409
Satisfaction	0.293	0.293

**5.2. Discussion**

This study has shown that Reading performance expectancy has a direct and significant impact on e-readers’ satisfaction. This result is consistent with previous research by Jin (2014), Joo et al (2017), and Verkijika (2019). Besides, all the factors including “perceived value”, “social influence” and “situational influence” have a direct impact on readers’ expectations about the effectiveness of e-books.

Among the factors affecting “expectations about the effectiveness of e-books”, perceived value is the factor with the most positive impact. When readers perceive that reading e-books is more beneficial than the

necessary costs, effort and time, they have a higher expectation of reading efficiency, leading to the higher satisfaction of e-readers.

“Social influence” is the following factor that has a positive effect on “reading performance expectancy” of e-book users. Specifically, when e-readers see that people around them have used e-books or have positive feelings about e-books, or people who influence them using e-books, they will have high expectations about the effectiveness of e-books, which will lead to more eagerness to use them. The results are similar to the previous study by Jin (2014) which demonstrated that subjective norms is one of the main factors affecting e-readers’ perceived usefulness.

The research results show that the situational influence has a moderate positive effect on reading performance expectations of users. It can be reasoned that situational influence (including the location of the store, the sound, the light or the situation of the time, the social situation and the mood of the users) also influence their buying behavior. Typically in the context of the Covid-19 pandemic, purchasing and reading e-books have helped people limit travel and face-to-face contact, thereby increasing their expectation about the effectiveness of e-book to their life and work. This is also considered a new point in this study as no previous study has demonstrated the impact of the situation (related to the Covid-19 pandemic) on the expectations of the effectiveness of e-books.

## 6. CONCLUSION

The results of this study demonstrated that efficiency expectations have a positive effect on satisfaction for e-book users. Therefore, when applying to a teaching and learning environment, the effectiveness of an e-book must include assessments and other adaptive contents designed to support active learning. Next, universities need to develop convenient infrastructure and internet access for students to exploit e-books from open-access e-book sources. Libraries should pay attention to exploiting and building open-access e-book sources, old versions of e-books (usually at low cost), collecting and developing e-book libraries for students to access, especially electronic textbooks in Vietnamese. In addition, suppliers need to adopt unlimited e-book subscriptions that include access to high-quality digital learning resources, geared toward higher education institutions in the event of a global pandemic or other catastrophic events that cause an abrupt diversion to online learning. In addition, such a system both has a positive impact on student achievement and is appreciated by students. To satisfy student needs better, remove barriers to their success, and improve student outcomes, universities must play a key role in supplying reasonable course content. The global pandemic has forced organizations to consider the benefits of integrated digital learning solutions, which are increasingly considered as more valuable than traditional textbooks because they are sold at much lower prices, and they are highly accepted by learners and is beneficial for active learning.

## 7. APPENDIX: MEASUREMENT ITEMS AND VARIABLES

Variables	Construct	Items	Sources
1. Situational Influences (SIT)	SIT1	Many traditional bookstores are closed during the Covid-19 pandemic.	Nguyen et al. (2020)
	SIT2	Buying books at traditional stores is very risky during the Covid-19 pandemic.	
	SIT3	Reading e-books becomes a trend during the Covid-19 pandemic.	
	SIT4	E-book reading websites/apps expand book catalogs during the Covid-19 pandemic.	
	SIT5	Websites/apps that read e-books have many promotions during the Covid-19 pandemic.	
2. Subjective norms (SN)	SN1	There are others who are using e-books around me	Jin (2014)
	SN2	People who know me have positive feelings about using e-books	
	SN3	People who influence me want to use e-books	

Variables	Construct	Items	Sources
3. Perceived value (VAL)	VAL1	Compared to the fee I need to pay, the use of the e-books offers value for money.	Hsiao & Chen (2017)
	VAL2	Compared to the effort I need to put in, the use of the e-books is beneficial to me	
	VAL3	Compared to the time I need to spend, the use of the e-books is worth while to me	
	VAL4	Compared to the time I need to spend, the use of the e-books is worthwhile to me	
4. Reading performance expectancy (RP)	RP1	Reading e-books is very helpful for my daily life.	Lee (2013), Jin (2014)
	RP2	Using e-books gives me useful information in life .	
	RP3	Using e-books can make my academic and reading behavior more efficient.	
	RP4	Using e-books is a convenient reading behavior	
	RP5	Using e-books is, overall, an efficient way to read.	
5.Satisfaction (SAT)	SAT1	Using e-books will meet my expectations.	Jin (2014)
	SAT2	I am satisfied with the quality of available e-book content	
	SAT3	I am satisfied overall with e-books.	

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## EXPLORING FACTORS AFFECTING THE KNOWLEDGE- SHARING ACTIVITIES OF ACCOUNTING STUDENTS IN HANOI

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*ABSTRACT: Under the strong impact of the current digital transformation and digital economy, knowledge-sharing activities play an increasingly important role in the development and achievement of competitive advantages for each individual and society as a whole. Knowledge is the core thing, the driving force for human development in the new era. Knowledge - sharing is a way to learn and accumulate new knowledge. When we have understanding and extensive knowledge of all areas of social life, each individual can easily achieve his or her own goals and dreams. Therefore, knowledge-sharing contributes to demonstrate abilities (educational level, communication ability,...) in today's ever-evolving society, especially in the context of booming digital transformation. The purpose of this paper is to explore the influence of factors on the knowledge-sharing activities of accounting students in Hanoi, then the author proposes some recommendations to improve the efficiency of knowledge-sharing activities of accounting students and at the same time improve the quality of knowledge for students. The article uses a combination of qualitative and quantitative research methods to assess the influence of factors on the knowledge-sharing activities of accounting students in Hanoi in the context of digital transformation. We found 3 factors that affect knowledge-sharing activities of accounting students. They are information technology; the support of university and the confidence of students. Based on the results, universities and accounting students will know which elements they need to improve in their training programs to improve the efficiency of students' knowledge sharing.*

**Keywords:** Knowledge – sharing, accounting students, factors affecting

### 1. INTRODUCTION

We live in an era where the world economy is transforming from an economy based primarily on the limited resources of nature to an economy of information and intelligence. Natural resources are left out of the competitive agenda, with knowledge and skills alone as resources that create a sustainable competitive advantage. As such, knowledge is increasingly becoming a resource, rather than a resource for wealth creation, it is widely recognized that knowledge is an important asset for individuals and organizations to succeed in the economy increasingly fierce competition (Syed khan and Rowland 2004, Van den Hoff and De Ridder 2004, Yang 2007). For accounting students at universities in Vietnam, knowledge-sharing activities need to be focused on and promoted furthermore. To become a good accountant in future, students need to prepare themselves with a lot of knowledge and skills. Accounting with industry characteristics is to receive and process a large amount of professional and professional knowledge. On the other hand, legal documents on accounting regulations and guidelines are often changed and supplemented, requiring accountants to learn; update and innovate to improve their capacity. Accounting work is closely related to economic activities taking place in the market, requiring students to be equipped with practical professional knowledge. At present, knowledge-sharing activities of accounting students in studying and working are limited and have not received adequate attention. Accounting students are often quite timid and lack of confidence when exchanging their knowledge in the field due to psychological uncertainty about their understanding. To improve the efficiency of knowledge-sharing activities of accounting students, one of the prerequisites is to identify the factors affecting knowledge-sharing.

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The store of knowledge of each person is endless and diverse. Every moment we are constantly receiving new knowledge and experiences. Much of our knowledge comes from the sharing of others. Most of the scientific knowledge and understanding is not discovered by us but inherited from the accumulation and transmission of many previous generations. *And the definition of “knowledge - sharing” is synthesized as “providing information related to the task being performed and how to solve the problem, generating new ideas, and finalizing policies or plans”* (Lin, Ye, Bi, 2014). According to Grant (1999), “*knowledge-sharing activity is a process that enhances organizational effectiveness by maximizing the use of knowledge shared by organizational members*”.

## 2. THEORETICAL FRAMEWORK

### 2.1. Literature review

Nguyen Manh Cuong, and Nguyen Tien Loi (2016) identified and measured the factors affecting the knowledge-sharing process of students through a quantitative research method with a sample of 504 observations collected from students at Hanoi University of Industry. Research shows that there are 4 groups of factors affecting the knowledge-sharing process of students at Hanoi University of Industry, which are: (1) Pressure from lecturers; (2) Encouragement support system; (3) Personal attitude; (4) Ability to access information.

Among the factors mentioned above, 3 factors including: Encouragement support system, personal attitude, and ability to access information have a positive influence on the results of the knowledge-sharing process. Research results show that the sharing and reception of knowledge in learning are most affected by their attitude and then the incentive support system, the ability to access information.

Akosile, A., & Olatokun, W. (2020) identified and measured the factors affecting knowledge-sharing among scholars at Bowen University - Nigeria. The method used is quantitative research through survey questionnaires with 151 answers obtained with 3 research variables: *Organizational factors* (Organizational culture; Reward system; Management support; University policy); *Personal factors* (Individual ability; Trust and willingness to share; Personal interaction; Personal expectations), *Technological factors*: (Availability of IT infrastructure; Use social media).

Research results from collected data show that in organizational factors, university policies significantly affect knowledge-sharing; while individual factors have faith significantly affect knowledge-sharing. Technological factors do not affect knowledge-sharing behavior. The findings extend knowledge and build theory in knowledge-sharing through conceptual frameworks. The study recommends that there should be a university policy on knowledge-sharing, accompanied by rewards to motivate scholars to share their knowledge.

Nguyen Le Nhan et al (2021) determined the factors affecting the knowledge-sharing behavior of students in general and students of Duy Tan University in particular. Through a mixed research method based on a survey of 300 students, the research results show that there are 4 factors affecting the knowledge-sharing behavior of students of Duy Tan University today: (1) *Rewards*; (2) *Information technology*; (3) *Belief in knowledge*; (4) *Teamwork*.

Quantitative statistics show that two factors have the greatest influence on students' knowledge-sharing activities: Rewards and information technology. Besides, the remaining factors also have a significant influence on the perception of knowledge-sharing activities. The article assessed the influence of factors on students' knowledge-sharing behavior; offered solutions to improve the efficiency of training and learning activities at universities.

Walaa J. Ali (2021) explored factors affecting knowledge-sharing among university students in Iraq. This study aimed to examine the impact of beliefs, attitudes, and information communication technology on knowledge-sharing among university students. The results show that all three variables: trust, attitude, and information and communication technology, have a positive and significant impact on knowledge-sharing among university students. However, the results show that trust is the most important factor that enhances knowledge-sharing among students. The university should improve the culture of knowledge-sharing among students to increase their productivity and knowledge. This study has some limitations as it was conducted in only one faculty within the university, which cannot generalize the results to all universities in Iraq. Furthermore, research conducted at a private university may have a different environment when compared to public universities.

## **2.2. Background theories**

### **2.2.1. Role theory**

According to Lattimore et al. (2004), a role is a set of daily activities of a person. Some researchers suggest that roles are related to an individual's expectations of how to behave in a given situation. Role theory is a sociological perspective that attempts to explain interactions between individuals in organizations by focusing on the roles that individuals hold. Role behavior is influenced by role expectations for appropriate behavior in that role. For example, accounting students have the role of guiding and advising their classmates in studying to successfully complete the final exam, most of their behaviors are influenced by expectations for their students in that role.

From our point of view, in the field of knowledge-sharing, role theory is applied to study the knowledge-sharing behavior of the organization in general, and students in particular (including accounting students) also considered necessary need because understanding the knowledge-sharing of students will help universities improve their operational efficiency and contribute to perfecting their knowledge management system in today's digital information environment. From different points of view, there are roles that students have to take on in the learning process, that is, the role of learners and researchers. In addition, role theory contributes to perfecting students' knowledge-sharing activities. Behavior is closely related to the role, or in other words, the role that guides the behavior of each individual. In the process of interacting with information, the role also contributes to the orientation of students' knowledge-sharing activities.

### **2.2.2. Social behavior theory**

The theory of social behavior was in the early twentieth century. Typical representatives of this theory were J. Watson – the first founder of behavioral theory, E. Thorndike, B.Ph. Skinner, E. Tolman, C. Hull and A. Bandura. Classical behavioral psychologists believed that the origin of behavioral factors was due to external environmental factors impact. According to behavioral theory, behavior is considered to be the result of a direct relationship between a stimulus and a response to that stimulus. Stimuli belongs to the world of action, and behavior is produced by the body. These studies are regulated on the study of creating an environment of stimuli and arranging them in a certain logical order to form desired responses, i.e. the process of “behavioral conditioning” (Partica H.M., 1989). On that basis, the Social behavior theory introduced by Blau (1964) is used to investigate the knowledge-sharing behavior of an individual. The theory proposed a model that could measure guided human actions, while also predicting the occurrence and performance of a particular act.

## **2.3. Research model proposal**

- *Information technology is a factor affecting the knowledge-sharing activities of accounting students.*

Information technology has been identified as a facilitator of knowledge-sharing (Mitchell, 2003). The role of information technology in knowledge-sharing and transfer becomes more and more important over time due to the advancement of technology. In the following years, many researchers have contributed to



explore the role of information technology in knowledge-sharing and transfer. Han and Anantatmula (2007) found that the availability and usability of technology are associated with the level of knowledge-sharing. Kim and Lee (2005) explored that information technology applications are one of the main variables affecting knowledge-sharing.

*- Confidence in personal abilities is a factor affecting the knowledge-sharing activities of accounting students.*

According to social exchange theory, not only benefits and costs, but also trust plays an important role in the exchange process between people. Wang and Noe (2010) argued that the importance of trust had so far received little attention in the knowledge-sharing literature. Therefore, the research has focused on two aspects of self-confidence that are closely related to self-efficacy when sharing knowledge and apprehension when evaluating, namely competence-based confidence and self-belief based on benevolence. Confidence is an important element of any information society as it enables social exchange, and knowledge-sharing (Alat et al., 2016; Jameel et al., 2020). If individuals in the network participate actively in knowledge-sharing activities, they can display their talents, kindness, and honesty to allow other participants to gauge their confidence (Evans et al., 2015; Massoudi et al., 2020).

*- Benefit of knowledge-sharing is a factor affecting the knowledge-sharing activities of accounting students.*

The social exchange framework also tells us about possible interactions between the perceived benefits of sharing and evaluative understanding. If the perceived benefit of an exchange is large enough, it may outweigh the expected negative effects of assessing the costs of knowledge-sharing. That is, the benefits of sharing may outweigh the costs involved. In other words, the negative relationship between assessment apprehension and knowledge-sharing may be stronger when perceived benefits are lower than when perceived benefits are high. Therefore, we predict that the benefit factor will have a certain influence on knowledge-sharing activities. Some other studies also support the view that organizations should create conditions for individuals to expand their social relationships because thereby knowledge-sharing is enhanced and more effective (Szulanski, 1996; Argote, 1999)

*- Process of knowledge-sharing is a factor affecting the knowledge-sharing activities of accounting students.*

Effective knowledge-sharing among students at all levels enhances collaborative learning by implementing a shared attitude that contributes to greater efficiency in the testing process. In education and development, it is important to share information, skills, ideas, and personal experiences. Knowledge-sharing is a series of activities related to sharing knowledge or assisting others. Mousa et al. (2019) clarified that knowledge-sharing is a twofold activity: Knowledge source and knowledge seeker, while information exchange applies only to the flow of knowledge through an entity, not between individuals. Knowledge-sharing refers to the activity through which people in an organization exchange information, skills, or expertise (Ayodele et al., 2016). According to Bartol and Srivastava (2002), knowledge-sharing refers to the action in which individuals disseminate essential information to others throughout an institution

*- The support of the university is a factor affecting the knowledge-sharing activities of accounting students.*

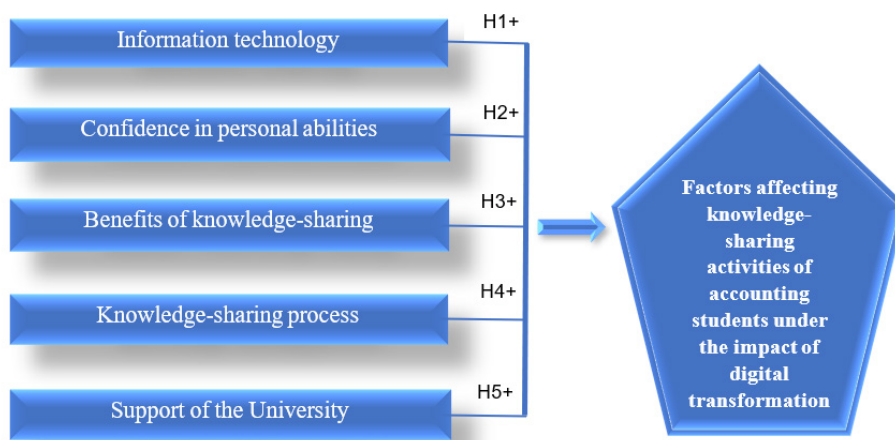
Top management support has been recognized as an important factor in supporting knowledge-sharing. This variable related to knowledge-sharing has been studied extensively by researchers in the context of knowledge-sharing. According to Cabrera (2006), increased support will positively affect knowledge-sharing. Due to pressure from managers and colleagues, employees will be more active in collecting or

contributing knowledge to other employees. If publications related to knowledge-sharing and transfer are scrutinized, it can be inferred that top management support has been researched and identified as motivating or facilitating knowledge-sharing (Cavaliere & Lombardi, 2015; McNichols, 2010; Titi Amayah, 2013). Top management support is believed to have a strong impact on knowledge collection and donation behavior (Cavaliere & Lombardi, 2015).

Based on related empirical studies, we synthesized the factors affecting knowledge-sharing process of accounting students in Hanoi in table 1 and figure 1 below:

**Table 1: Synthesis of factors affecting knowledge-sharing activities of accounting students in Hanoi**

H1	Information technology is a factor affecting the knowledge-sharing activities of accounting students at universities in Hanoi.
H2	Confidence in personal abilities is a factor affecting the knowledge-sharing activities of accounting students at universities in Hanoi.
H3	Benefit of knowledge-sharing is a factor affecting the knowledge-sharing activities of accounting students at universities in Hanoi.
H4	Knowledge-sharing process is a factor affecting the knowledge-sharing activities of accounting students at universities in Hanoi.
H5	Support of the university is a factor affecting the knowledge-sharing activities of accounting students at universities in Hanoi.



**Figure 1: Proposed research model**

**3. RESEARCH METHODS**

Research methods used include: documentary research method, descriptive statistical method, method of comparison, etc. All of these methods are derived from the subject’s point of view dialectical and historical materialism aim to solve related problems in a dialectical and logical way. And the two main research methods used in combination in this article are the qualitative and the quantitative research method.

The qualitative research method is conducted through theoretical research and previous studies related to the factors affecting knowledge-sharing activities of accounting students at universities in Hanoi. The objective of qualitative research is to test, screen, and determine the relationship between variables in the theoretical model, on that basis, propose a research model. In addition, the study also calibrated and developed the scales inherited from previous studies to suit the research objectives.

In the research model, the proposed model has 5 independent variables with 22 observed variables, the sample size is expected to be about 250. After the experimental investigation and the correction of the questionnaire, the official survey was conducted on a large scale for accounting students in Hanoi via google forms and email within 3 months (from November 2022 to January 2023, we received 296 answer sheets, respectively 100%). After screening and analyzing, the group used 271 valid answer sheets. All responses with missing data were excluded from the analysis.

Data processing methods were implemented, including: descriptive statistics, exploratory factor analysis, scale testing (Cronbach's Alpha), correlation analysis, and regression analysis - testing hypotheses. Data collected from questionnaires are processed by 2 softwares:

- Microsoft Excel software for summarizing, descriptive statistics of objects and survey contents.
- SPSS 20.0 software to check the reliability of the scale and research hypotheses. We used descriptive methods to interpret the obtained statistical results.

## **4. RESULTS AND DISCUSSION**

### **4.1. Results**

#### **4.1.1. Qualitative research results**

The method used is the theoretical background method. As follows:

we collected data by interviewing, then arranged the data into groups, then linked the groups together, and finally found the nuclear information. After the process of data collection and analysis, we formed 5 hypotheses which were 5 factors of digital transformation affecting the knowledge-sharing activities of accounting students at universities in Hanoi.

With the method of direct distribution of votes to 15 random students majoring in Accounting in Hanoi The group has summarized the following results:

- All 15 students have applied digital transformation in knowledge-sharing activities: 100%
- The factors of digital transformation affecting knowledge-sharing activities of accounting students after analyzing, obtained the following results:

- The information technology factor: 100%
- The factor of confidence in personal abilities: 60%
- The benefit of knowledge-sharing factor: 53.3%
- The knowledge-sharing process factor: 20%
- The support of the university factor: 80%

*Thus, it can be seen that:*

- Hypotheses about information technology, confidence in personal abilities, benefits of knowledge-sharing, and support of the university are accepted.

- The factor of information technology and the support of the university are the two factors that have the most impact on the knowledge-sharing activities of accounting students at universities in Hanoi.

#### **4.1.2. Check the reliability of the scale**

The results of Cronbach's Alpha coefficient show that all independent and dependent variables in the research model: "The information technology factor", "The factor of confidence in personal abilities", "The benefit of knowledge-sharing", "The knowledge-sharing process", "The support of the university" and "Knowledge-sharing" have Cronbach's Alpha from 0.781 to 0.870. At the same time, all observed variables had total correlation coefficients greater than 0.3. All these indexes are larger than the minimum to ensure the reliability and discriminability of the factors (Hair et al., 2010) and should be included in the analysis in the next steps.

#### **4.1.3. Exploratory factor analysis EFA**

After meeting the requirements of the reliability test, we included an exploratory factor analysis with 22 observed variables of independent variables in the research model. Because the sample size of the group was 271,

when analyzing the EFA exploratory factor, the group chose a Loading factor of 0.35. Through table 4.4, it can be seen that all observed variables have Factor Loading load factor > 0.35; however, there is still the phenomenon of observed variables uploading in both factors and the difference in loading factor is not guaranteed from 0.3 so the group removed five variables: QT3, QT2, QT4, QT1, LI3; in case the observed variable is uploaded in both factors, but the difference between the two variables is greater than 0.3, the observed variables NT1, NT3 are kept to conduct the second EFA discovery coefficient analysis shown in Table 1:

**Table 1: EFA factor analysis**

Rotated Component Matrix<sup>a</sup>

	Component		
	1	2	3
CN1	0.693		
LI4	0.670	0.403	
CN5	0.670		
CN3	0.656		
LI1	0.653		
LI2	0.631		
CN2	0.626		
LI5	0.562	0.407	
CN4	0.545		
NT2		0.767	
NT1		0.743	
NT4		0.743	
NT3		0.730	
TT3			0.820
TT1			0.810
TT4			0.785
TT2			0.751

(Source: Authors' survey)

Table 1 shows that there are still observed variables that have the phenomenon of uploading in both factors and do not guarantee the difference in loading factor from 0.3, so the group continues to exclude variables: LI4, LI5 to conduct coefficient analysis explore EFA for the 3rd time with 15 observed variables (table 2):

**Table 2: EFA factor analysis**

Rotated Component Matrix<sup>a</sup>

	Component		
	1	2	3
CN1	0.711		
CN3	0.687		
CN5	0.661		
CN2	0.650		
LI1	0.623		
CN4	0.590		

LI2	0.564		0.361
TT3		0.826	
TT4		0.803	
TT1		0.796	
TT2	0.352	0.746	
NT2			0.776
NT1			0.763
NT3			0.740
NT4			0.738

(Source: Authors' survey)

After the 3rd EFA exploratory factor analysis, there is still a case that the observed variable uploads in both factors and does not guarantee the difference in loading factor from 0.3 is the variable: LI2, however, the case where the observed variable is uploaded in both factors but the difference between two variables is greater than 0.3, so in this case, the observed variable TT2 is accepted, next we conduct the elimination of LI2 variable and performs the 4th exploratory factor analysis (Table 3):

**Table 3: EFA factor analysis**

**Rotated Component Matrix<sup>a</sup>**

	Component		
	1	2	3
CN1	0.708		
CN3	0.700		
CN2	0.661		
CN5	0.638		
CN4	0.633		
LI1	0.576		
TT3		0.830	
TT4		0.809	
TT1		0.794	
TT2		0.752	
NT2			0.779
NT1			0.770
NT3			0.746
NT4			0.736

(Source: Authors' survey)

Table 3 shows the accepted variables. Thus, after analyzing EFA, the group eliminated 8 observed variables (table 4) and obtained those variables: CN1, CN2, CN3, CN4, CN5, LI1, TT1, TT2, TT3, TT4, NT1, NT2, NT3, NT4.

**Table 4: KMO and Bartlett's Test**

KMO and Bartlett's Test		
<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</b>		<b>.902</b>
Bartlett's Test of Sphericity	Approx. Chi-Square	1727.519
	df	91
	Sig.	.000

(Source: Authors' survey)

The KMO coefficient of 0.902 (> 0.5) is very high and sig = 0.000 < 0.5, so it can be concluded that observed variables are correlated with each other in the population and EFA factor analysis is appropriate. The total variance used to explain the factors is 62.638% > 50%, so the conditions are satisfied for the factor analysis (table 5).

**Table 5: Total Variance Explained**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.132	43.802	43.802	6.132	43.802	43.802	3.038	21.697	21.697
2	1.518	10.846	54.647	1.518	10.846	54.647	2.941	21.007	42.704
3	1.119	7.991	62.638	1.119	7.991	62.638	2.791	19.935	62.638
4	.770	5.497	68.136						
5	.640	4.568	72.704						
6	.629	4.490	77.194						
7	.570	4.071	81.265						
8	.522	3.371	84.997						
9	.470	3.355	88.352						
10	.419	2.990	91.341						
11	.391	2.789	94.131						
12	.310	2.211	96.342						
13	.297	2.122	98.464						
14	.215	1.536	100.000						

(Source: Authors' survey)

The 4th EFA exploratory factor analysis results extracted 3 factors with a very high KMO index of 0.902 (> 0.5), Eigenvalue index of 1,119 (> 1), total variance extracted was 62,638% (> 50%), Bartlett's test has a significance level of 0.000 (<0.05). So these factors are independent variables and included in the next steps to test the research model (table 6).

**Table 6: Component Score Coefficient Matrix**

	Component		
	1	2	3
TT2	.739	-.417	
CN5	.701		
TT4	.701	-.492	
NT3	.691		
NT2	.689	-.353	
CN3	.684		
TT3	.668	-.542	
NT1	.661	.392	
NT4	.658		-.432
LI1	.650		
CN2	.634		
TT1	.632	-.528	
CN1	.622		
CN4	.506		.427

(Source: Authors' survey)

Through analyzing the influence of each observed variable on each factor, the group found that the observed variables all affect factor 1 in a positive direction, so these variables positively affect factor 1 and at the same time, these variables also create a positive relationship with the factor and increase the value of

factor 1. For factor 2, five variables are showing a negative relationship, namely TT1, TT2, TT3, TT4, and NT2 variables, so these five variables create a negative impact on factor 2 or reduce the value of the factor. Factor 3 also has a variable representing the negative relationship, the variable NT4, so this variable harms factor 3 and at the same time reduces the value of this factor.

**4.1.4. Results of exploratory factor analysis EFA for the dependent variable**

The research model of impacts of digital transformation on knowledge-sharing activities of accounting students at universities in Hanoi is expected through the following equation:

$$KS = \beta_0 + \beta_1CN + \beta_2TT + \beta_3NT + \epsilon$$

EFA results for the dependent variable KS (Knowledge-Sharing) is drawn. EFA also fits the data because the total variance extracted is 76,306 (> 50%), KMO = 0.729 (> 0.5), and the Bartlett’s test is statistically significant (sig = 0.000 < 0.05). So the scale is still used for the next analysis (shown in table 7 and 8).

**Table 7: KMO and Bartlett’s Test**

KMO and Bartlett’s Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.729
Bartlett’s Test of Sphericity	Approx. Chi-Square	333.479
	df	3
	Sig.	.000

(Source: Authors’ survey)

**Table 8: Total Variance Explained**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.289	76.306	76.306	2.289	76.306	76.306
2	.374	12.468	88.775			
3	.337	11.225	100.000			

(Source: Authors’ survey)

The results of the regression analysis of the effects of knowledge-sharing activities of accounting students at universities in Hanoi are shown in Table 9 as follows:

**Table 9: Total Variance Explained**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Colinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.556	.258		2.158	.032	
	TECHNOLOGY	.571	.079	.447	7.265	.000	.538
	CONFIDENCE	.099	.048	.116	2.085	.038	.655
	UNIVERSITY	.223	.061	.213	3.642	.000	.596

(Source: Authors’ survey)

Table 9 shows that all factors have sig significance < 0.05, all variables are correlated and have statistical significance in the research model. Variance magnification factor VIF < 2, so it can be concluded that there is no multicollinearity between these three factors.

The linear regression equation showing the effects of digital transformation on knowledge-sharing activities of accounting students at universities in Hanoi is shown as follows:

$$KS = 0.556 + 0.571CN + 0.099TT + 0.223NT$$

Based on the magnitude of the normalized regression coefficient Beta, the order of impact level from the highest to the lowest of the independent variables on the dependent variable CSKT is as follows: (1) CN:0.571; (2) NT: 0.223; (3) TT: 0.099, where: *KS: Knowledge-sharing; CN: The influence of technology factor; NT: The influence of the university factor; TT: The influence of the confidence factor*

#### 4.2. Discussion

Through the above equation, it shows that there are 3 impacts on knowledge-sharing activity of accounting in Hanoi. Specifically:

With a Beta coefficient of 0.571, the factor CN (technology - CN1, CN2, CN3, CN4, CN5, LI1) has the greatest influence on knowledge-sharing activities of accounting students at universities in Hanoi. The positive sign (+) of the Beta coefficient indicates a positive relationship. The regression results show that the Beta coefficient is 0.571 and Sig = 0.000 (<0.05), that is, when other factors are unchanged if the technology hypothesis is increased by 1 unit, the knowledge-sharing activity of students will increase to 0.571 units. Research results show that when students are aware and highly appreciative of the technology factor or have a good technology background, it will increase the efficiency of knowledge-sharing activities. Thus, the technology factor has a positive impact on the knowledge-sharing activities of accounting students at universities.

The second factor that affects the knowledge-sharing activities of accounting students at universities in Hanoi is the university factor (NT1, NT2, NT3, NT4). The positive sign of the coefficient Beta means that the relationship between these two factors is a positive relationship. With the coefficient Beta = 0.223 and Sig = 0.000 (<0.05), that is, when other factors remain unchanged if the benefit is increased by 1 unit, the knowledge-sharing activity of students will increase by 0.223 units. Research results show that when students study in a good university training environment, with enthusiastic support from the university, it will increase the efficiency of knowledge-sharing activities of accounting students.

The last factor that affects the knowledge-sharing activities of accounting students is the confidence factor (TT1, TT2, TT3, TT4). The positive sign of the coefficient Beta means that the relationship between these two factors is a positive relationship. With the coefficient Beta = 0.099 and Sig = 0.038 (<0.05), that is, when other factors are unchanged if the confidence factor increases by 1 unit, the knowledge-sharing activity of students will increase by 0.099 units. Research results show that the confidence factor is compatible with the application of digital transformation in the knowledge-sharing activities of accounting students.

#### 5. CONCLUSION

The study of factors affecting knowledge-sharing activities of accounting students at universities in Hanoi is necessary, contributing to raising awareness and understanding of the importance of knowledge - sharing; thereby promoting the process of knowledge-sharing among students, and improving the learning and working efficiency of accounting students at universities. At the same time, from a certain perspective, it helps organizations, universities and training institutions be better understand the psychology of students, especially teaching organizations, to be able to capture information, apply successfully use the scientific and technical achievements of the digital transformation process to adjust the mode of knowledge-sharing between lecturers and students and between students inside and outside the university.



This result shows the level of impact from low to high on the knowledge-sharing activities of accounting students at universities in Hanoi. Before sharing knowledge in certain activities or fields to develop more skills and improve self-awareness, students always equip themselves with confidence in their own abilities, confidence in communication skills, expression skills, persuasion skills, and other soft skills to be able to confidently share and impart their knowledge to everyone. This is considered an extremely important factor, because it not only helps students become more confident in terms of specialized knowledge and professional handling skills in presenting their personal views and opinions when still in university, but in the long-run, this is also a factor for employers and leaders to evaluate and choose the right factors for the positions of the business, or in other words, this is a factor that creates opportunities for advancement and career development after graduation.

Next is the support of the university factor, the university creates supportive policies, creating favorable conditions for accounting students to better understand the importance of the digital transformation process of knowledge transfers, and have the opportunity to have more access to the sciences, advanced technology, and modern. The university provides equipment or prepares skills, training sessions on how to apply digital transformation to make knowledge exchange easier and more convenient.

Then is the influence of Information technology or the application of scientific achievements of the 4.0 technology revolution to knowledge-sharing activities. Learners will learn the supporting software and applications when applying digital transformation to this activity, consider whether they help in the process of sharing their knowledge and whether the technology level is fully compatible and consistent with the knowledge-sharing process. Therefore, this is also a factor affecting the knowledge-sharing of learners themselves.

The next level of influence is the factors belonging to Benefits of knowledge-sharing such as: help improve learning results, help adapt to change better, adapt well to changes in the trend of technology, serve as a premise to adapt to the process of international integration in future work; in addition, it also helps me to be more confident, have more opportunities to learn and make friends, and give me the opportunity to be recognized and trusted. Although its impact is not as great as The Information technology factor and the support of the university factor, it is also a factor affecting the knowledge-sharing activities of learners.

Besides, the remaining factor, like Knowledge-sharing process, completely does not affect the knowledge-sharing activities of learners. This result is consistent with knowledge-sharing activities of accounting students in the current period. Because this is only a small, insignificant external impact, it may partially affect the knowledge-sharing process of accounting students in the study area, as a factor to consider, but this factor will not completely affect students' knowledge-sharing activities.

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## SELLER REPUTATION, TRUST AND ONLINE PURCHASE INTENTION OF CONSUMERS IN VIETNAM

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**ABSTRACT:** Prior research has found that reputation significantly affects trust (Doney & Cannon, 1997; Grazioli & Jarvenpaa, 2000) and reputation building is extremely important for merchants. In recent years, the income of Vietnamese citizens has been on the rise, but still remains average compared to neighboring countries and low compared to the global average. While traditional shopping methods are still commonly used, there is a growing preference among Vietnamese consumers for electronic commerce platforms. However, they are careful and consider many factors in online shopping. In this paper, we explored the role of seller reputation in the relationship between trust and online shopping by building a model with 4 variables, 6 hypotheses and 21 observed variables. A sample of 267 consumers from Vietnam were surveyed, and all analysis is performed using structural equation modeling (SEM) by SmartPLS. Research results show that seller reputation influences the relationship between trust and online shopping intention of Vietnamese consumers through customer service quality. The article provides recommendations to improve trust and online shopping intention for Vietnamese consumers, offering solutions for consumers, e-sellers, and related associations and organizations.

**Key words:** Seller reputation, Trust, Online purchase intention, Consumer in Vietnam

### 1. INTRODUCTION

According to statistics of the Ministry of Information and Communications, up to September 2021, Vietnam has 72.1 million people using the Internet in daily life. Vietnamese users spend an average of 7 hours a day engaged in Internet-related activities. The Internet has become an essential part of Vietnamese people's lives, particularly among the younger generation.

Originating from changes in technology, people's behavior in other countries has changed as well. In Vietnam, this is especially evident. Despite the COVID-19 pandemic hitting Southeast Asia hard, e-commerce in Vietnam has not only remained unaffected, but has also been promoted to develop more strongly than ever before, leading to consumers' behaviors and habits also changing. According to a survey of 6,500 consumers in Vietnam, Australia, Indonesia, Korea, Thailand, the Philippines, and Taiwan (China) about business conversations conducted by Meta and Boston Consulting Group in 2022, Vietnam has the highest conversational turnover among the surveyed markets, up to 73% of Vietnamese consumers use chat messages to approach businesses. According to Meta, this shows that Business Messaging continues to play a role in improving the customer experience and bringing businesses closer to customers, as it enables customers to interact with online stores in a more natural and conversational way.

The White Book on Vietnamese Business 2022 published by the Ministry of Industry and Trade, the number of Vietnamese shopping online reached more than 51 million, up 13.5% over the previous year. This paper also shows that the percentage of Internet users buying online reached 74.8% and their expenditure on this kind of shopping approximated to 12.42 billion USD. According to the Decision No. 645/QĐ-TTg about the master plan for e-commerce development during 2021 - 2025, Vietnam's e-commerce is predicted to grow an average of 25% per year, reaching 35 billion USD by 2025, accounting for 10% of

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total retail sales and service revenue. This indicates the trend of e-commerce in Vietnam, particularly the online shopping trend.

A majority of consumers use the internet to browse for information concerning their future purchase item on Internet shopping websites, however, only a small number of them actually buy that item online (Chen & Barnes, 2007; Johnson, 2007). It suggests that consumers may not be fully convinced of the reliability and trustworthiness of these service providers.

In many studies, reputation is a direct factor influencing trust (Anderson et al.; Weitz, 1989; Doney et al.; Cannon, 1997; Grazioli et al.; Jarvenpaa, 2000). For that reason, building reputation is crucial to sellers, and on that basis, this study examines the role of seller reputation in the relationship between belief and online purchase intention. The findings of this research are intent on recommending some solutions to improve the trust of online consumers.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Consumers and Online Consumers**

#### **\* Consumers**

According to Clause 1, Article 3 of the Law on Protection of Consumer Rights 2010: “Consumers are those who purchase and use goods and services for consumption and daily life purposes of individuals, families or organizations”. In the scope of this research paper: Consumers include not only individual consumers but also organizations (such as state management agencies, businesses, social organizations, industry associations, etc.) ) purchase and use goods and services for the purpose of consumption, serving the daily needs of that individual, family or organization.

#### **\* Online consumers**

Magdalena Jaciow et al. (2011) define online consumers by combining the two concepts “consumer” and “online”. The term “online customer” is sometimes used interchangeably with “online consumer,” although the two terms have many differences. Specifically, the concept of “online customer” has a broader meaning, because it is a person who uses a computer or mobile device with an Internet connection to buy a product or service regardless of the purpose of use (Nguyen Thanh Do & Ha Ngoc Thang, 2014; Tran Van Hoe, 2008); while “online consumers” make purchases only to serve the daily needs and consumption of individuals, households or an organization.

Based on these definitions, the research team defines online consumers as individuals, households, or organizations that use electronic devices connected to the Internet to purchase and use products, goods, and services for personal or organizational consumption and daily-life purposes, either in part or in full.

### **2.2. Trust and Online trust**

#### **\* Trust:**

According to Crosby et al. (1990), from the perspective of the relationship between sellers and buyers, trust is the confidence that the seller will act in the interests of the customer. while Zaheer et al. (1998) conceptualize trust as an expectation that sellers will fulfill their obligations, act fairly, and refrain from taking advantage of personal interests. In this study, the authors argue that trust can be considered as “consumer’s expectation on seller’s behavior to meet customers’ needs and interests, through taking risks in the transaction process”.

#### **\* Online trust:**

Subjects in online trust are different from traditional beliefs, including the Internet, Websites and technology (Chanidapa P. et al., 2012). Online trust is mainly associated with trust on the Internet and, in particular, with e-commerce (Taddeo, 2011). Beldad, de Jong, & Steehouder (2010) argue that it is “a

confident attitude in an online risk situation that one's vulnerabilities will not be exploited." Based on the above perspectives, online trust can be defined as "the willingness to be vulnerable in the online environment, where direct contact and physical communication are absent, and interactions are mediated by digital and technological devices, where social norms and ethical values are perceived differently by each individual".

## **2.2. Seller reputation and Service quality**

### *\* Seller reputation*

Seller reputation is defined as customers' positive perception of a seller due to the customer's exposure to the seller's products/services or any prior associated with the seller. (Chatpong Tangmanee et al., 2016).

### *\* Service quality*

Most of the studies on service quality use the definition of Parasuraman et al. (1985) who argue that service quality is "the gap between customers' expectations and their perception of the outcome of the service experience." In this study, the research team defines the seller's service quality as the service that the seller provides to satisfy the needs in the consumer's shopping process, as determined by the consumer's perception used during the experience.

## **2.3. Relationship between customers' trust and online purchase intention of Vietnamese consumers**

Online shopping trust (Customer Trust) can be defined as a set of beliefs held by online consumers regarding certain characteristics of an online seller, also as possible behaviors of future online sellers (Coulter and Coulter, 2002). Trust becomes more important in e-commerce because consumers cannot touch, feel or smell the actual product. In that case, trust plays a crucial role in the relationship between consumers and e-vendors. (Fung & Lee, 1999).

Moreover, trust is the emotional foundation for building close relationships with customers (Halliburton, 2010). According to the research literature, trust is recognized as a factor that brings good results for businesses, especially for those dealing in items with high risk and uncertainty. Additionally, trust helps create customer loyalty. When customers trust a business, they are more willing to establish lasting deals, spend more, and refer the community to that business.

## **3. RESEARCH MODEL AND HYPOTHESES**

### **3.1. Research models**

Theoretical models and theories used to study shopping beliefs online shopping and online shopping intent include TPB, TAM, TRA, and C - TAM - TPB. The above-mentioned theoretical models can help to study this problem with similar variables in terms of perceived behavioral control (perceived ease of use, perceived risk,...) security, privacy, quality of customer service,...).

After synthesizing the theoretical foundations and research overview, the authors found that the studies confirmed the positive impact of the trust factor affecting the intention to shop online (Varma et al. associates, 2019; Dan J.Kim et al., 2008; Neelam Chawla et al., 2021; M. Koufaris, 2002; Chatpong Tangmanee, 2016). The seller Reputation factor plays a causal role: website reputation has the highest degree of positive impact while trust contributes the least to purchase intention, i.e. reputation The higher the quality of the website or the high trustworthiness of the website, the higher the purchase intention will be (Chatpong Tangmanee, Chayanin Rawsena, 2016). The quality of customer service is the mediating factor to promote the online shopping intention of consumers (Brian J. Corbitt, 2003; B. Daroch, 2020).

From the process of research overview, the authors build a research hypothesis model as follows:

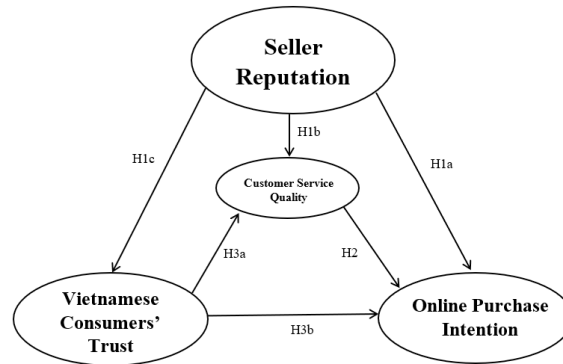


Figure 1: Research model

Source: Author's Team

### 3.2. Research hypotheses

The research model hypotheses are explained as follows:

#### (1) Seller reputation

In the article “Consumer Trust in Brand: Can it be Built Through Brand Reputation, Brand Competence and Brand Predictability” (2010), brand reputation is defined as the attitude of consumers towards a brand as being good and trustworthy. Reputation has a direct influence on trust, as indicated by Anderson and Weitz (1989), Doney and Cannon (1997), and Grazioli and Jarvenpaa (2000). Companies build their reputation by showing care and honesty towards their customers (Doney & Cannon, 1997).

According to Jarvenpaa and Tractinsky (1999), consumers are more likely to trust a company with a good reputation. Gefen (2000) suggests that people use reputation to trust a company if they do not have enough information and experience with it.

Based on these insights, the authors hypothesize the following:

**H1a: Seller reputation has a positive effect on online purchase intention.**

**H1b: Seller reputation has a positive effect on customer service quality.**

**H1c: Seller reputation has a positive effect on Vietnamese consumers' trust.**

#### (2) Quality of customer service

The three main elements of an e-vendor's service - customer communication, delivery, and after-sales service - are significantly related to online buyers' trustworthiness (Nguyen Ngoc An, 2006). In terms of communication, although customers can obtain product-related information from recommendations, photos, and reviews from other buyers on the website, they may still need to contact the supplier directly through phone or instant messaging for further explanations or clarifications. In these situations, the customer experience will be significantly influenced by the communications conducted by supplier representatives who can inspire customer trust and confidence by their professionalism and understanding (Malin Gustavsson, Ann-Marie Johansson, 2006). With regard to delivery, online shoppers are not in the same geographical location as the supplier. If the buyer can receive the goods as promised, confidence in the supplier's ability and commitment to keeping their promises is enhanced. Moreover, there may be cases where customers are disappointed by the product's non-conformity with their expectations. Unless e-vendors show empathy for these concerns and offer opportunities to return products, online shoppers will not be willing to transact in the future. Based on these findings, the authors hypothesize that:

***H2: Customer service quality has a positive impact on online purchase intention.***

### **(3) Vietnamese consumers' trust**

Trust can be defined as the tendency of customers to repurchase a certain electronic supplier's products with a lower degree of doubt when they have experienced satisfaction with that supplier (Nguyen Ngoc An, 2006). Gefen (2002) suggests that specific beliefs about integrity, ability, and benevolence are seen as preconditions for overall trust. A lack of trust has been noted as one of the main reasons that discourage consumers from shopping online (Jarvenpaa, 2000; Lee, 2001). If trust is not established, online transactions are impossible (Winch, 2016). Therefore, customers' trust in online sellers is the foundation of online shopping (Chen, 2012). In the context of online shopping, trust plays a crucial role because customers perceive higher transaction risks in the online environment as they do not have direct contact with the seller or the product they intend to buy (Jarvenpaa, 2000; Pavlou, 2003).

Trust is built when online providers offer good quality products and services (Gefen, 2002). Therefore, when consumers have a foundation of trust based on past experiences, the challenge for providers is to continually improve service quality to meet customers' expectations. Otherwise, the customer's trust in the seller will quickly be broken.

Based on the above arguments, we propose the following hypotheses:

***H3a: Vietnamese consumers' trust has a positive effect on customer service quality.***

***H3b: Trust has a positive effect on online purchase intention.***

### **(4) Online purchase intention**

Intention is a factor used to assess the ability to perform a behavior in the future (Blackwell et al., 2001). According to Ajzen (1991), intention is the motivating factor that encourages an individual to be willing to perform a behavior. Therefore, Delafrooz et al. (2011) argue that "online shopping intention is the certainty of consumers' ability to make purchases over the Internet." Shopping intention is typically viewed as one of the two factors that decisively influence consumer buying behavior (Blackwell, 2001).

According to Hess (2008), a seller's reputation is the buyer's perception of how the seller takes care of their customers, and it affects the relationship between frustration and purchase satisfaction, thereby influencing purchase intention after a customer has a poor service experience. Additionally, Chatpong Tangmanee (2016) highlights that the reputation of a shopping website helps to shape customers' online trust, which also positively impacts their purchase intention.

## **4. RESEARCH METHOD**

\* ***Sample object:*** In this study, the sample object is Vietnamese consumers across all 63 provinces and territories of Vietnam. The survey sample is guaranteed to be from all socio-economic regions of Vietnam.

\* ***Sample size:*** This sample size is proposed based on the opinion of Hair et al. (2006) that the minimum sample size to be achieved must be greater than or equal to  $m*5$  (where  $m$  is the number of variables). In this study, with a total of 21 observed variables, the minimum sample size must be greater than or equal to 105. However, to ensure high reliability, the team conducted a survey of 267 consumers. During the investigation, only 198 valid votes were obtained, of which 191 respondents had previous experience shopping online, while the remaining 7 had not.

\* ***Survey method:*** In this article, the authors use a combination of two research methods: qualitative and quantitative. Qualitative is the object observation and the review of research materials, while quantitative is done by surveying using questionnaires according to a Likert scale with 7 levels from (1) "Completely no influence" to (7) "Completely influence".

\* **Measurement and validity:** This study uses SPSS software to ensure the accuracy of the data and the reliability of the scale based on Cronbach's Alpha coefficient analysis. In addition, the group also analyzed EFA exploratory factors, which made it possible to examine the relationship between variables in all different groups (factors) in order to discover observed variables that load more or observed variables are factored differently from the beginning.

\* **Data analysis techniques:** In addition, the variables after being found to be valid will be analyzed by the partial least squares structure model (PLS-SEM) using SMARTPLS 4.0 software.

## 5. RESEARCH RESULTS

### 5.1. Sample profile

According to the survey results of 198 consumers, the percentage of Vietnamese female consumers (69.2%) is higher than that of men (30.3%), showing that Vietnamese women tend to be more interested in shopping and consuming than men.

In terms of age, a large proportion of participants in this survey are young people under 24 years old (90.9%). The age group from 55 - 64 years old and over 65 years old both account for 0.5%, this age group is considered as the elderly, less exposed to the Internet and shopping online than young people. Students dominate the sample at an accumulated proportion of 89% because this is a dynamic group of consumers, who acquire quickly, use technology proficiently, and have high shopping needs. The survey also found that the majority of consumers in this group are young and have a monthly income of under 5 million VND (40.4%) or no income at all (42.4%). The research sample represents consumers living in many different regions and regions with The majority of respondents coming from the Red River Delta and Northeast coast, specifically the capital Hanoi. This is a developed economic area with high living standards and good technology infrastructure, therefore their online shopping experience here is also more diverse than in other regions.

191 consumers who responded to the survey said they have had an online shopping experience (96.5%) and 160 of them (97.9%) intend to continue to buy in the future. In terms of shopping channels, Vietnamese consumers prefer using e-commerce platforms (Tiki, Shopee, Lazada, ...) with 164 respondents, accounting for 85.9% of those who have purchased online. Regarding shopping channels, social media channels such as Facebook and Instagram accounted for 7.3% of online purchases, while online shopping applications made up 3.6%, and seller websites were responsible for 3.2%. These findings demonstrate the growing trend of e-commerce platforms in the online shopping market, due to the convenience, competitive prices, and variety of products that they offer. Customers are able to research, compare prices, and read product reviews, which has led to changes in their purchasing habits.

The frequency of online shopping among Vietnamese consumers is currently relatively low, the majority choose that they shop less than once a week (60.7%), followed by 1-3 times/week accounted for 33% of respondents, only 4.7% of consumers shop online 3-5 times/week and the lowest is the frequency of shopping more than 5 times/week with 1.6% of respondents. The most commonly purchased product category on online shopping platforms is fashion, which accounted for 90.4% of total respondents; followed by cosmetics (66.7%) and personal care products (58.1%). These results reflect the fact that a majority of respondents (69.2% female) are interested in beauty care products. However, for products with a short shelf life, such as food, only 35.9% of respondents were comfortable buying them online. The pharmaceutical and functional foods industry had the lowest percentage of online shoppers at 22.2%.

Regarding payment methods, 48.2% of the respondents who shopped online preferred the payment method by e-wallet because of its convenience and speed, followed by the forms of using credit cards (25.7



%) and COD (24.6%), debit cards (7.9%). Some respondents choose different payment methods for each transaction.

## 5.2. Results of the model test

### *\* Evaluate the reliability of the scale with Cronbach's Alpha coefficient:*

Cronbach's Alpha coefficient has a variable value in the interval [0,1]. According to Nunnally (1978), a good scale should have a Cronbach's Alpha reliability of 0.7 or higher. Besides, according to Cristobal et al. (2007), a good scale is when the observed variables have a Corrected Item - Total Correlation value from 0.3 or more.

The results of the analysis of each scale are shown in the following table:

**Table 1. Evaluate the reliability of the scale with Cronbach's Alpha coefficient**

Encryption	Corrected Item-Total Correlation	Cronbach's Alpha if item Deleted
Customer Service Quality (CS): Cronbach's Alpha Reliability = 0.950		
CS1	0.720	0.950
CS2	0.827	0.943
CS3	0.857	0.941
CS4	0.803	0.944
CS5	0.830	0.942
CS6	0.826	0.943
CS7	0.861	0.941
CS8	0.812	0.944
Seller Reputation (BR): Cronbach's Alpha Reliability = 0.918		
BR1	0.820	0.890
BR2	0.876	0.871
BR3	0.795	0.899
BR4	0.757	0.912
Consumer's Trust (TR): Cronbach's Alpha Reliability = 0.910		
TR1	0.734	0.897
TR2	0.829	0.877
TR3	0.790	0.886
TR4	0.796	0.884
TR5	0.710	0.902
Online Shopping Intention (IP): Cronbach's Alpha Reliability = 0.889		
IP1	0.753	0.859
IP2	0.805	0.840
IP3	0.757	0.859
IP4	0.717	0.873

Source: The author's team synthesized the results of SPSS survey data processing.

Based on the table above, it is evident that all scales in the research provided by the authors are highly reliable, with Cronbach's Alpha coefficient greater than 0.8.

### *\* EFA exploratory factor analysis:*

- Testing the model's suitability (Kaiser Meyer-Olkin) and correlation between the observed variables (Bartlett's Test):

The table for KMO and Bartlett's Test below shows that the KMO index exceeds the threshold of 0.5, with a value of 0.922, indicating that exploratory factor analysis is suitable for real data.

**Table 2. KMO and Bartlett’s Test**

<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</b>		<b>.922</b>
Bartlett’s Test of Sphericity	Approx. Chi-Square	3797,199
	DF	.210
	Sig.	.000

Source: The author’s team synthesized the results of SPSS survey data processing.

The Bartlett’s Test results have a significance value (Sig) of 0.000, which is less than the significance level (0.05). Therefore, we can conclude that the observed variables are correlated with each other in each factor group.

- Test the extracted variance of the factors (% Cumulative variance):

Based on the results presented below, we observe that the total variance extracted in the Factor 4 row and Cumulative% column is 71.183%, which exceeds the 50% threshold required to meet the criteria. Moreover, all the eigenvalues of the extracted factors are high (>1), with the fourth factor having the smallest eigenvalue coefficient of 1.164>1. Consequently, we can conclude that these 4 extracted factors provide an optimal summary of the information from the 21 observed variables included in the EFA and explain 71.183% of the variation in the data of the 21 variables observed in the EFA. The following table presents the results of the extracted variance test of the factors:

**Table 3. The total of the extracted differences between variables**

Factor	Total Variance Explained						Rotation Sums of Squared Loadings Total
	Initial Eigenvalues			Extraction Sums of Squared Loadings			
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
1	11,353	54,064	54.063	11.071	52.720	52.720	9,357
2	2,088	9,945	64.008	1,797	8,557	61.277	7,380
3	1.465	6.974	70.982	1.214	5.781	67.058	7,765
4	1.164	5.545	76.527	.866	4.125	71,183	7.819
5	.676	3,220	79.747				
6	.562	2.675	82.423				
7	.459	2.184	84.606				
8	.451	2.148	86.754				
9	.386	1,840	88.593				
10	.310	1.477	90.071				
11	.307	1.460	91.531				
12	.287	1.367	92.897				
13	.257	1.223	94.120				
14	.219	1.042	95.162				
15	.201	.959	96.121				
16	.187	.890	97.011				
17	.160	.763	97.773				
18	.141	.670	98.443				
19	.139	.660	99.104				
20	.108	.516	99.620				
21	.080	.380	100.000				

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Source: The author’s team synthesized the results of SPSS survey data processing.

- *Checking factor loading with Pattern Matrix rotation table:*

The research team used the Principal Axis Factoring method with Promax rotation when running the data. The results showed that even in the first analysis, all factors had coefficients of factor load  $>0.5$ , meaning that no shuffling, splitting, or pooling of data occurred. As a result, the team concluded that the EFA results were consistent with the model.

**Table 4. Pattern Matrix**

	Factor			
	1	2	3	4
CS7	.939			
CS6	.900			
CS8	.880			
CS5	.836			
CS3	.796			
CS2	.789			
CS4	.732			
CS1	.545			
TR2		.867		
TR3		.843		
TR4		.821		
TR5		.665		
TR1		.603		
BR2			.944	
BR1			.891	
BR3			.753	
BR4			.739	
IP2				.848
IP3				.788
IP4				.748
IP1				.687
Extraction Method: Principal Axis Factoring				
Rotation Method: Promax with Kaiser Normalization				
a. Rotation converged in 6 iterations				

*Source: The author's team synthesizes from the results of SPSS survey data processing*

After filtering the data due to unsatisfactory responses, only 198 samples were included in testing the model. Four variables were selected for the SEM linear structural model evaluation after checking the reliability and quality of the scales during EFA.

**\* Analysis of SEM (Structural equation modeling):**

When evaluating the SEM, the research model must go through two evaluation steps: the evaluation of the measurement model and the structural model (Henseler and Chin, 2010).

- *Evaluation of the Measurement Model:*

Before evaluating the model, we must assess the quality of the observed variables (indicators):

According to Hair et al. (2014), the outer loading coefficient must be greater than 0.4 to be reliable in exploratory research. Moorees and Chang (2006) accepted a study with an external factor loading factor  $>0.6$ . Additionally, Hair et al. (2016) believe that an observed variable is of quality if the outer loading factor is greater than or equal to 0.708.

The results below demonstrate that all observed variables have high outerloading coefficients ( $>0.708$ ), indicating that the quality of the observed variables in the study is guaranteed.

**Table 5. Coefficients for Loading of Observed Variables in External Factors**

	BR	CS	IP	TR
BR1	0.902			
BR2	0.937			
BR3	0.886			
BR4	0.859			
CS1		0.785		
CS2		0.869		
CS3		0.894		
CS4		0.851		
CS5		0.875		
CS6		0.869		
CS7		0.896		
CS8		0.858		
IP1			0.868	
IP2			0.895	
IP3			0.864	
IP4			0.841	
TR1				0.845
TR2				0.897
TR3				0.868
TR4				0.868
TR5				0.807

Source: Author team synthesized from the results of SmartPLS survey data processing

*- Reliability Assessment using the Reliability Scale and Convergence:*

In addition to requiring Cronbach’s Alpha to reach a threshold of 0.7 or higher (according to DeVellis, 2012), researchers also use Composite Reliability (CR), which is preferred because Cronbach’s Alpha underestimates reliability more than CR. According to Chin (1998), in exploratory research, CR should be 0.6 or higher. In confirmatory studies, a threshold of 0.7 is the appropriate level of the CR index (Henseler & Sarstedt, 2013). Many other researchers also agree that 0.7 is the appropriate threshold for the majority of cases, such as Hair et al. (2010) and Bagozzi & Yi (1988).

The results in *Table 5* show that all scales have high reliability with a Cronbach’s Alpha coefficient ( $>0.7$ ) and a CR coefficient ( $>0.8$ ).

*- Convergence Rating:*

To evaluate convergence on SmartPLS, people rely on the average variance extracted (AVE). According to Hock and Ringle (2010), a scale has a converged value if the AVE is 0.5 or higher. This level of 0.5 (50%) means that the average parent latent variable will explain at least 50% of the variation of each observed child variable.

Based on the results in *Table 6*, all scales have an AVE  $> 0.5$ , which proves that the scales are of good quality and convergence is guaranteed.

**Table 6. Assessment of Reliability and Convergence**

	<b>Cronbach's alpha</b>	<b>Composite reliability (rho_a)</b>	<b>Composite reliability (rho_c)</b>	<b>Average variance extracted (AVE)</b>
BR	0.918	0.921	0.942	0.804
CS	0.961	0.951	0.959	0.745
IP	0.890	0.890	0.924	0.752
TR	0.910	0.913	0.933	0.735

Source: Author team synthesized from the results of SmartPLS survey data processing

*- Discriminant Validity Assessment*

To assess the discriminant validity, we used the HTMT index (Heterotrait-Monotrait Ratio). Garson (2016) suggests that the discriminant validity between two latent variables is ensured when the HTMT index is less than 1. Henseler et al. (2015) propose that if the value is below 0.9, discriminant validity is ensured. Meanwhile, Clark & Watson (1995) and Kline (2015) use a more stringent threshold of less than 0.85. According to the results in the table below, all HTMT values are less than 0.85, indicating that the discriminant validity of the scale is very good. Therefore, all factors meet the requirements for discriminant validity.

**Table 7. Assessment of Discriminant Validity**

	<b>BR</b>	<b>CS</b>	<b>IP</b>	<b>TR</b>
BR				
CS	0.700			
IP	0.610	0.684		
TR	0.623	0.610	0.729	

Source: Author team synthesized from the results of SmartPLS survey data processing

*\* Evaluation of PLS - SEM Measurement Structure Model:*

To evaluate the structural model PLS - SEM, our research team conducted bootstrap analysis with 5000 bootstrap iterations. When evaluating the structural model, we considered the following criteria: VIF coefficient evaluation, multicollinearity evaluation, impact factor evaluation, significance of impact levels, R-Square coefficient, and f-Squared coefficient.

*- Evaluation of Linear Multicollinearity:*

According to Hair et al. (2019), if the VIF index is 5 or greater, the model has a very high probability of having multicollinearity. Based on the results in the table below, the structures in the SEM model with VIF coefficients ranging from 1,000 to 1,951 are all less than 5, indicating that the model does not have multicollinearity.

**Table 8. Evaluation of Linear Multicollinearity**

	<b>BR</b>	<b>CS</b>	<b>IP</b>	<b>TR</b>
BR		1.489	1.951	1.000
CS			1.938	
IP				
TR		1.489	1.651	

Source: Author team synthesized from the results of SmartPLS survey data processing

*- Assessing the explanatory power of the independent variable on the dependent variable (adjusted R2):*

In research, the adjusted R-squared metric gauges the explanatory power of the independent and dependent variables in the model. As shown in the table below, the adjusted R-squared value for IP is 0.528, indicating that the independent variables account for 52.8% of the variation (variance). The remaining 47.2% is attributable to system error and external factors not accounted for in the model.

**Table 9. R-squared adjusted (R<sup>2</sup> adjusted)**

	R-square	R-square adjusted
CS	0.484	0.479
IP	0.535	0.528
TR	0.328	0.325

Source: Author team synthesized from the results of SmartPLS survey data processing

- Value of the influence of the independent variable on the dependent variable:

The coefficient f-square helps us understand the strength and weakness of the impact of the independent variable on the dependent variable. Cohen (1988) proposed the f-square index table to evaluate the importance of independent variables as follows:

f Square < 0.02: the effect is extremely small or has no effect.

0.02 ≤ f Square < 0.15: small impact.

0.15 ≤ f Square < 0.35: medium impact.

f Square ≥ 0.35: high impact

Based on the analysis results in the table below, BR has a medium impact on CS (0.310), an extremely small or no impact on IP (0.012), and a large impact on TR (0.489). CS has a small impact on IP (0.119), TR has a small impact on CS (0.109), and a medium impact on IP (0.222).

**Table 10. Impact value of f - square**

	BR	CS	IP	TR
BR		0.310	0.012	0.489
CS			0.119	
IP				
TR		0.109	0.222	

Source: Author team synthesized from the results of SmartPLS survey data processing

- Evaluation of impact relationships

To evaluate the impact relationships, we'll be using the results of the bootstrap analysis. There are two indicators we need to keep an eye on: the normalized effect coefficients (original sample) and P values (sig value compared to the significance level of 0.05).

Based on the table, most of the effects have a P value of 0.05, which means that these effects are statistically significant. However, there is a variable that affects BR on IP with P values of 0.204 > 0.05, which indicates that this relationship is not statistically significant. Nevertheless, this could be due to cases of data noise or errors in the sampling process.

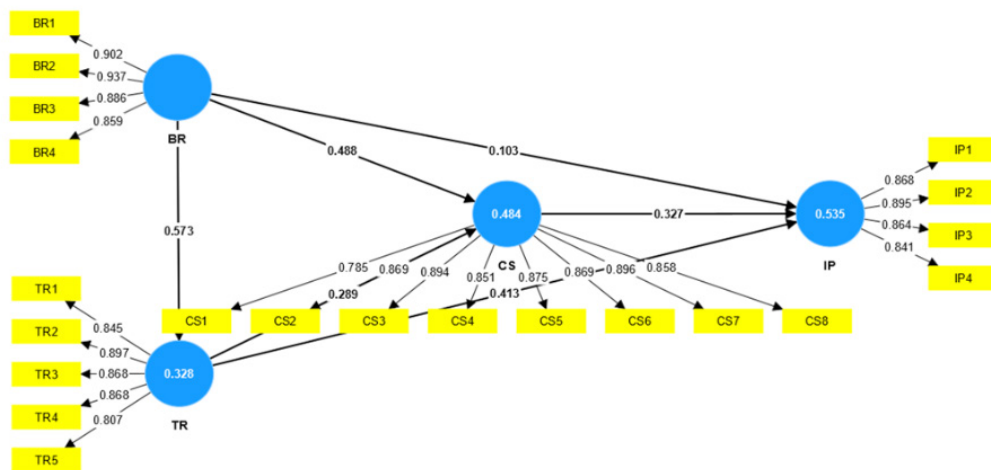
The Original Sample column (O) displays the particular relationship between the variables in the SEM model, where: IP is the dependent variable, influenced by two variables, TR and CS, with normalized impact coefficients of 0.413 and 0.327, respectively; CS is a dependent variable, affected by two variables, BR and TR, with normalization coefficients of 0.488 and 0.289, respectively; and finally, IP is affected by CS with a normalization factor of 0.327.

**Table 11. Coefficient Values for Impact Relationships**

	Original Sample (O)	Original Mean (M)	Standard Deviation (STDEV)	T Statistics ( O/STDEV )	P Values
BR → CS	0.488	0.485	0.079	6.172	0.000
BR → IP	0.103	0.108	0.081	1.270	0.204
BR → TR	0.573	0.572	0.058	9.839	0.000
CS → IP	0.327	0.321	0.084	3,915	0.000
TR → CS	0.289	0.292	0.073	3,975	0.000
TR → IP	0.413	0.415	0.071	5.797	0.000

Source: Author team synthesized from the results of SmartPLS survey data processing

Here is a chart showing the results of the PLS - SEM linear structure model:



**Figure 2. Results of the linear structural model PLS - SEM**

Source: Author team synthesized from the results of SmartPLS survey data processing

**6. CONCLUSION AND RECOMMENDATIONS**

**6.1. Conclusion**

SEM estimation results indicate that Seller Reputation does not affect Online Purchase Intention but has a positive impact on Customer Service Quality and Consumers’ trust. Meanwhile, Customer Service Quality has a positive influence on Online Purchase Intention. Vietnamese Consumers’ trust has a positive influence on both Customer Service Quality and Online Purchase Intention.

**6.2. Recommendations**

**\* Recommendations for consumers:**

- Choose reputable online product/service providers: Consumers need to be more careful when choosing online sellers by considering factors such as the seller’s reputation, product quality/services, and information provided, etc. This can help avoid falling into risky situations in the online environment.
- Actively stay updated on trends and new forms of online shopping: Continuously updating information can help consumers stay current and access new and improved shopping models to protect their interests.

**\* Recommendations for E-sellers:**

- Ensure the reputation of after-sales and warranty policies: The survey results of the study showed that

consumers tend to be more satisfied with the quality of services provided by online sellers, who show that their warranty service is always available. Therefore, sellers need to ensure that they are always available to assist customers in situations where support is required.

- Invest in marketing campaigns: Online sellers can deploy appropriate forms of online marketing. Sellers need to constantly research and expand the scope of Marketing to a variety of platforms and online channels.

- Clearly demonstrate community responsibility and actively participate in customer-oriented activities, in particular, and the community in general: From a social responsibility standpoint, corporate social responsibility (CSR) is essential for online sellers. When online sellers adhere to commitments to business ethics and contribute to sustainable economic development, they can improve the quality of life for employees and their families, local communities, and society at large.

- Ensure the quality of information on information and sales pages: Online sellers need to pay more attention to the accuracy and completeness of information about products and services provided. It is important to give short, easy-to-understand messages as an effective way to facilitate decisions (Silverman 2001).

- Strengthen market research activities: Online sellers can collect information from a variety of sources for research purposes. In addition, they need to regularly monitor the development and trends of the sales platform they are using, the business activities of competitors, etc. to determine the most appropriate strategy for their business.

**\* Recommendations for Related Associations and Organizations:**

- Actively protect the interests of online consumers: Associations of businesses in various fields need to encourage individuals and organizations to provide quality products and services while building a reputable brand name in the market. Activities that reward and honor organizations and individuals for protecting consumer interests should be promoted. Social organizations that protect consumer interests should continue their role as a reliable source of advice and support, assisting consumers to resolve complaints with service and goods providers.

- Promote propaganda and exchanges that raise awareness of online consumers: It is necessary to promote regulations, policies, and laws related to consumer rights and responsibilities. Organizations and individuals that trade goods and services should be made aware of their responsibilities, as should state management agencies and social organizations that protect consumers' interests.

- Focus on supporting and resolving consumer concerns about the risks they may face when participating in online shopping: Organizations and associations that protect consumer interests, such as the Association Protecting Vietnamese Consumers, should promote their role in guiding and consulting to resolve consumer complaints.

### **6.3. Limitations and directions for future research**

**\* Limitations:**

- The research is limited in terms of time and funding; therefore, it lacks generality and coverage of the entire territory of Vietnam.

- Some consumers do not have sufficient knowledge and skills, which leads to misunderstandings and emotional responses, leading to deviations from other answers in the questionnaire.

- The theoretical basis and presentation of the content have some shortcomings due to the research team's inexperience.

- This study only examines the role of seller reputation in the relationship between trust and intention. There may be other important factors that affect the relationship between trust and intention, but they are not mentioned in this research.



- The solutions proposed by the research team are specific to the appropriate extent for the actual situation.

**\* Future research directions:**

- Conduct follow-up studies to develop research models with more appropriate and extended variables.
- Expand the scope of the research, with a larger sample from diverse demographics.
- Explore and identify other factors that affect the relationship between Trust and Online Purchase Intention.

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## APPLICATION OF THE SEM MODEL TO EVALUATE THE EFFECTIVENESS OF SUPPLY CHAIN MANAGEMENT USING BLOCKCHAIN TECHNOLOGY: A STUDY ON SHOPEE.VN

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*ABSTRACT: Supply chain management (SCM) plays a crucial role in the operations of organizations, particularly on e-commerce platforms. In the fast-developing environment of international supply chains, the traditional network of manufacturers and suppliers has evolved into a vast ecosystem of different products moving through multiple parties, requiring cooperation among all involved. Blockchain technology has shown promising results in improving the supply chain network in recent applications, deeply impacting society and lifestyles by reshaping many business and industrial processes. In an effort to understand the integration of Blockchain technology in supply chain management, particularly on e-commerce platforms, this study uses a linear SEM model and UTAUT model to discover the effects of Blockchain technology on enhancing the effectiveness of supply chain management on the Shopee.vn e-commerce platform. The experiment shows that expected effectiveness, effort, facilitating conditions, supply chain traceability application, behavioral intention, and cost value have a proportional impact on the effectiveness of supply chain management.*

**Keywords:** SEM, Blockchain, SCM, UTAUT, E-Commerce.

### 1. INTRODUCTION

Supply Chain Management (SCM) is the process of managing operational activities related to the production, transportation, and distribution of products to end customers. SCM is an important sector in business and plays a crucial role in optimizing processes, enhancing flexibility, and reducing costs. According to the report (MarketSandMarkets, 2022), with the development of information technology, SCM can be optimized and improved by applying advanced technologies such as Blockchain. Markets and Markets forecasts the global SCM market size to grow from USD 28.9 billion in 2022 to USD 45.2 billion by 2027, at a Compound Annual Growth Rate (CAGR) of 9.4% during 2022–2027. The major growth drivers for the market include increasing demand for greater efficiency and transparency in supply chain data and distribution processes.

According to (Kouhizbaeh et al, 2021; Kuhn et al., 2019; Rejeb et al, 2019) Blockchain is a technology that focuses on creating a decentralized and secure ledger system. In SCM, Blockchain can be used to create a supply chain management system that helps all parties involved track and store information related to products, from the manufacturing process to transportation and storage. Blockchain provides high transparency and helps increase trust among supply chain stakeholders. Applications of Blockchain in SCM include product source management, process optimization, and cost reduction. According to (GrandViewResearch, 2023), Blockchain in the SCM market is expected to reach a total value of USD 3.3 billion by 2025, with an average annual growth rate of 49.9% in the forecast period. Additionally, a study by DHL and Accenture shows that 83% of SCM experts believe that Blockchain will have a positive impact on their supply chain within the next three years.

With the support of Blockchain Technology, SCM can create an efficient, secure, and decentralized supply chain management platform for e-commerce (Korpela et al., 2017; Boucher, 2017; Vyas et al., 2019;

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Swan, 2017). This helps address existing issues such as difficulties in tracking product sources, compliance with complex regulations, and managing stakeholders. Companies that integrate Blockchain Technology into SCM can optimize processes, reduce costs, and increase revenue. According to PwC, using Blockchain in SCM can reduce transportation and storage costs by up to 10% and increase operational efficiency by up to 15%. Therefore, SCM with Blockchain can help enhance the competitiveness of businesses and increase customer trust (Leng et al, 2018; Giri and Manohar, 2021).

Blockchain Technology provides four key features that can enhance integration and coordination among the members of an SC (Sultan and Lakhani, 2018; Vyas et al., 2019; Yaga et al., 2018): (1) transparency, (2) validation, (3) automation, and (4) tokenization. Transparency relates to the shared ledger of information which is aggregated from various sources and participants of the Blockchain. Immutability of records and consensus-based verification enable validation of information. Automation refers to the opportunity to execute smart contracts based on verified information on the Blockchain. Blockchain Technology allows creation of tokens that represent a specific claim on any valuable asset and their exchange between Blockchain members (tokenization). Enabled by these four key features of Blockchain Technology, one can derive corresponding use case clusters in SCM that build on one another: Supply Chain Visibility; Supply Chain Integrity; Supply Chain Orchestration; Supply Chain Virtualization; Finally, Supply Chain Finance.

In addition, the application of Blockchain technology in e-commerce in Vietnam is still limited. However, there are a number of projects and products that are in the process of being built and developed. One of the products using Blockchain technology is Remitano, a cryptocurrency exchange founded in 2016. Remitano has become one of the largest cryptocurrency exchanges in Vietnam and Southeast Asia. In addition, Binance, another cryptocurrency exchange, has introduced a Vietnamese version, allowing users to buy and sell cryptocurrencies in VND.

Although there are still many challenges and limitations that need to be removed such as: a lack of understanding of Vietnamese users about Blockchain technology; problems with legal regulations and information security; The cost of investing and implementing Blockchain technology is still quite high... However, with the potential and benefits that Blockchain technology brings, businesses are gradually realizing the value of using this technology. The development of products and services applying Blockchain technology in e-commerce will continue to be encouraged and promoted in the coming time.

In the context of the increasing attention and development of Blockchain applications in SCM, a research team has conducted a study on the topic “*Evaluating the Effectiveness of Blockchain Technology on Supply Chain Management Systems: A Study on Shopee.vn*”. The aim of the study is to identify factors that impact the acceptance of Blockchain Technology by companies and businesses in supply chain management operations in Hanoi and provide some policy implications for businesses and the government. The paper is divided into three main sections: theoretical background, research results, and proposed policy implications. The final part is the conclusion and reference materials.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Blockchain technology**

Blockchain is a decentralized technology that helps record transactions between parties in a secure and long-lasting manner. According to (Boucher, 2017; Kühn et al., 2019; Karim et al., 2018), Blockchain can be defined as a distributed ledger technology that allows parties to exchange data securely without intermediaries. Blockchain can facilitate the transition from a centralized to a distributed system, freeing up data that was previously held in secure data warehouses.

The application of Blockchain in SCM is one of the main reasons for the development of this technology. According to (Boucher, 2017; Casado et al., 2018; Leng et al., 2018; CTA and GIZ, 2019; Chien, 2020; Miraz et al., 2019), using Blockchain in SCM improves transparency and the reliability of information in the supply chain, reduces risks related to information security and counterfeit goods, reduces transportation and storage costs, and increases operational efficiency. Blockchain in SCM helps enhance transparency and monitoring of the supply chain by allowing stakeholders to verify the origin and history of products, reducing incidents during transportation and storage, and minimizing risks related to information security and counterfeit goods.

Blockchain is also applied in e-commerce to ensure the safety and transparency of transactions (Hameed et al., 2018; Zhu and Kraemer, 2005; Hastig and Sodhi, 2020). The use of Blockchain in e-commerce can reduce order processing time from several days to just a few hours, reduce shipping costs, etc. Additionally, Blockchain helps increase transparency in the transaction process and prevent information leakage. These studies also showed that the use of Blockchain in e-commerce can build trust with customers and increase their willingness to continue shopping on e-commerce platforms. With this feature, Blockchain has been widely applied in many fields, from finance and insurance to supply chain management and e-commerce.

In the case of the Shopee platform, Blockchain technology can improve the linkage in the supply chain by providing secure and transparent transactions. It can help to enhance the coordination and collaboration among different stakeholders, such as suppliers, logistics providers, and customers. By allowing stakeholders to verify the origin and history of products, Blockchain can improve the transparency and traceability of the supply chain, which can lead to better performance and customer satisfaction.

## **2.2. Supply Chain Management**

According to (Christopher, 1998; CSCMP, 2018; Hameed et al., 2018; Moosavi et al., 2021), “Supply chain includes all activities directly or indirectly related to meeting customer demand. The supply chain involves not only manufacturers and suppliers but also transportation, warehouses, retailers, and customers.” Supply Chain Management (SCM) is an important concept in the field of business management. It refers to the management of the entire process of production, storage, and distribution of products from suppliers to customers. SCM includes activities such as supply chain management, manufacturing, storage, transportation, and product distribution. The goal of SCM is to optimize this process to ensure that products are distributed to the right place, at the right time, and with the best quality, while reducing costs and enhancing the competitiveness of the business.

Technology has played a vital role in the development of supply chain management. Technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), Blockchain, and Big Data have been applied to improve the operations of the supply chain. Many studies have shown that using these technologies in supply chain management can increase efficiency and reduce costs. For example, (Rejeb et al., 2019) presented an IoT-based supply chain monitoring platform that improved the ability to track products and reduce waste during transportation. In another study, (Pournader et al., 2020; Miraz et al., 2019) demonstrated that Blockchain Technology can provide transparency and security for transactions in the supply chain, reducing the risk of counterfeiting and fraud. (Hameed et al., 2018) also highlighted that using Big Data in SCM can optimize production and transportation processes, thereby improving the efficiency of the supply chain. Meanwhile, (Kuhn et al., 2019; Hastig and Sodhi, 2020) presented the concept of a “digital twin” in supply chain management, a new technology aimed at addressing the complexity of supply chain management and identifying the causes of the “bullwhip effect” phenomenon.

In e-commerce, supply chain management is an important factor to meet the increasing demand of customers and create a competitive advantage in the industry. According to a report by (Statista.com, 2022), the global market value of e-commerce is expected to reach over 6.3 trillion USD by 2024. Applying appropriate SCM strategies can help reduce transportation costs, maximize profits, and enhance the shopping experience of customers. Some mass e-commerce businesses, such as Amazon and Alibaba (WTO, 2019; AWS, 2022), have heavily invested in optimizing SCM with modern technologies such as AI and Blockchain. For example (AWS, 2022), Amazon has implemented an automated supply chain management system with the support of AI, optimizing warehouse management, predicting product demand, and improving transportation processes. Additionally, Alibaba has developed a global supply chain management system using Blockchain, increasing transparency and accuracy in information management and reducing the risk of counterfeit goods. Using appropriate SCM strategies and applying modern technologies helps e-commerce businesses enhance their competitiveness, optimize production and transportation processes, and create significant benefits for customers with effective and convenient shopping experiences.

One important difference between Blockchain and a traditional centralized network is that Blockchain-stored data is undeletable and un-editable. In a centralized database, there is always the risk of fraud or external hacker attacks, while in a Blockchain, the network will work consistently unless an attacker manages to take control of the majority of the network; therefore, a large number of users almost significantly reduces the possibility of fraud (Arman and Philip, 2018; Dursun et al., 2020).

In a supply chain, ownership of products changes several times among participants until they are delivered to consumers. For low-added-value products such as agricultural commodities and certain types of mining commodities, supply chains function as an aggregation method by which goods are provided by many small-scale producers to larger-scale supply chain partners for further processing towards an end-product. Consumers cannot be sure about the reliability of data in current supply chain systems. The existing model becomes even more burdensome in the global supply chain. A reliable system is difficult, even impossible, to build on a global scale without building trust. With the advent of Blockchain as a disruptive technology for most processes related to our daily lives, the transition to the use of Blockchain Technology (CSCMP, 2018; Moosavi et al., 2021; Bolssey et al., 2019) has begun to overcome all these challenges in supply chains. Participants and their roles in a typical Blockchain-integrated supply chain flow can be depicted.

### **2.3. The e-commerce platform Shopee.vn**

Shopee is an online shopping application (Shopee Live) and e-commerce exchange based in Singapore, owned by Sea Ltd., founded in 2009 by Forrest Li. Shopee is now available in the following countries: Singapore, Malaysia, Thailand, Taiwan, Indonesia, Vietnam, the Philippines, and Brazil (Shopee.vn; Jaipong, 2020)

Shopee.vn (<https://shopee.vn>) is a big e-commerce platform in Vietnam, founded in 2015. Shopee holds the largest market share and is the most successful online sales channel in the country, the top 2 and top 3 are Lazada and Tiki respectively. This online platform provides buying, selling, delivery, and online payment solutions for businesses and individuals. Currently, Shopee.vn is one of the largest and most popular e-commerce platforms in Vietnam, with over 20 million users and 50,000 registered businesses. Recently, Shopee.vn has made significant progress, especially in the context of the rapidly developing e-commerce market in Vietnam. Initially, the business model that Shopee pursues is C2C (consumer-to-consumer), i.e., as an intermediary between individuals. Currently, Shopee has expanded the B2C model

(business-to-consumer), i.e., buying and selling between businesses and individuals, where Shopee still acts as an intermediary link. However, now Shopee Vietnam has become a hybrid model when there is both B2C (business to consumer) and Shopee has charged the seller's fee, commission, and product listing fee. This platform not only provides effective business solutions for companies but also brings convenient and reliable shopping experiences to consumers. However, to maintain and develop Shopee.vn in the future, continuous investment and research on the latest business solutions and technologies are necessary. In particular, the use of Blockchain Technology to enhance the safety and transparency of supply chain management on Shopee.vn is being proposed and researched to address challenges related to customer information management and protection, as well as to improve the integrity and reliability of the supply chain on this e-commerce platform.

Shopee uses a quantitative sourcing model, in which products are stored at distribution centers across the country. Once an order is placed, the product is shipped to the nearest processing center for packaging and shipping to the customer. The typical about Shopee's supply chain is that Shopee has suppliers from many different countries, providing customers with a variety of products in terms of categories and prices. About the Shipping System, Shopee uses an integrated and diversified shipping system, including major shipping partners and domestic shipping services. This helps ensure that products are shipped to customers quickly and on time. Unlike Shopee, Lazada manages from the ordering process to the delivery to the customer. Therefore, shipping fee is higher and the delivery time is longer than Shopee.

The supply chain on the Shopee platform is an important process in Shopee's business. It includes the steps from ordering, packaging, shipping, to the product being delivered to the customer. The goal of the supply chain on Shopee is to ensure that the buying and selling processes happen quickly and on time. In addition, the supply chain also helps Shopee manage inventory, optimize shipping costs and ensure product quality. Inventory management helps Shopee know the number of products in stock and update the status of the goods. Optimizing shipping costs helps Shopee save costs and reduce product prices, while attracting customers. Ensuring product quality helps Shopee create customer trust and maintain its reputation in the market. With the support of the supply chain on Shopee, Shopee is able to provide quality products at competitive prices and respond to customers' needs quickly and efficiently.

Therefore, this study chose Shopee to conduct a survey to analyze and make an assessment of the role of Blockchain in supply chain management.

### **3. RESEARCH METHOD**

#### **3.1. Related works**

Currently, research on Blockchain in supply chain management is limited and sparse. Most of the sessions are merely focused on introducing the theoretical concepts of Blockchain, discussing its potential benefits, and providing a general overview of its application landscape.

According to (Ho and Bui, 2018; Ghode, 2020; Altaf, 2022), Blockchain Technology enables transparent, robust systems that are less dependent on intermediaries through clear and easily traceable origin tracking, facilitating accountability in supply chains. (Blossey et al., 2019; Nguyen, 2020; Cole et al., 2019), Blockchain Technology is still in its early stages, and leading global corporations such as IBM (USA), Samsung (South Korea), and Walmart (USA) are making efforts to experiment with and grasp this future technology. According to (Kühn et al., 2019; Blossey et al., 2019; Treiblmaier, 2018) conducted a study on the current application of Blockchain in logistics service providers and based on the Technology-Organization-Environment (TOE) framework, identifying supporting and limiting factors. The study concluded that small and medium-sized

logistics service providers in Germany are not actively involved in Blockchain Technology. Larger logistics service providers, however, have started identifying their own use cases and are making further efforts to develop them through collaborative projects with partners. According to (Miraz et al., 2019; Ghode, 2020; Giri and Manohar, 2021) conducted a study exploring the factors related to the organizational structure for applying Blockchain in the post-supply chain. The theoretical foundation of this research is the Unified Theory of Acceptance and Use of Technology (UTAUT). The authors addressed innovation in applying the IT capabilities of companies and utilized factors such as e-logistics, IT capability, service quality of employees, and post-supply chain performance adjusted from other international standards to demonstrate the effectiveness of applying Blockchain to these factors. Studies revealed that excellent service quality from employees, an IT capability system, and the implementation of Blockchain significantly impact the operational efficiency of post-supply chain companies.

Currently, the application of Blockchain in the SCM field is still relatively new, and there have been no experimental deployment results that have reached the maturity level required to provide data for research purposes. The latest scientific papers on the application of Blockchain for information retrieval analyze the theoretical aspects. Building upon the advantages and limitations of previous studies, the author approached an extended UTAUT model, supplemented with new observed variables, and conducted quantitative testing in a new environment, which is Hanoi, where no similar study has been conducted before.

**3.2. Research method**

This study combines qualitative and quantitative research. For qualitative research, it first builds and strengthens a theoretical research model through existing research and behavioral research models. For quantitative research, it identifies and measures factors affecting the efficiency of SCM when using Blockchain in businesses and for Shopee users in Vietnam. The study was carried out through the data collection of live survey questionnaires and online questionnaires, and we used a 5-point Likert scale: 1 being completely disagreed, 2 being disagreed, 3 being neutral, 4 being agreed, and 5 being completely agreed.

*Qualitative research:* This method involved data collection, synthesis, and evaluation of literature, referencing measurement scales, and conducting interviews to draw appropriate conclusions for the study.

*Quantitative research:* The research team performed this method by collecting data from survey questionnaires, which were then processed using software such as Stata, SPSS, and AMOS. Data analysis techniques include descriptive statistics, Cronbach’s alpha reliability coefficient test, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation modeling (SEM).

**3.3. Proposed research model**

Based on the accepted and widely used theoretical frameworks such as UTAUT, UTAUT2, Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), integrated TPB and TAM models, Innovation Diffusion Theory (IDT), Motivation Model (MM), Perceived Computer Utility Model (MPCU), Social Cognitive Theory (SCT), and relevant surveyed stakeholders, the factors included in this research are presented in Table 1 below:

**Table 1: Table of Impact Factors**

	Sign	Factor	Referential interpretation
H1	EE	Expectation of Efficiency	(Miraz et al., 2019), (Venkatesh et al., 2003), (Davis et al., 1989, 1992), (Venkatesh and Davis, 2000), (Davis et al., 1993), (Thompson et al., 1991), (Rogers, 1995), (Compeau and Higgins, 1995).



H2	EA	Expectation of Attempt	(Miraz et al., 2019), Venkatesh et al., (2003), Davis et al., (1989, 1992), Venkatesh and Davis (2000), Thompson et al., (1991), Rogers (1995).
H3	FC	Facilitating Condition	Miraz et al., (2019), Venkatesh et al., (2012), Ajen (1985, 1991), Davis et al., (1989, 1992), Thompson et al., (1991), Rogers (1995), Venkatesh (2000).
H4	SI	Social Influence	Francisco et al., (2015), Lu et al., (2017), Nguyễn Thị Thùy Vân and Nguyễn Duy Thanh (2016), Taylor and Todd (1995), Venkatesh et al., (2003), Wu and Chen (2017), Fishbein and Ajzen (1975, 1980), Davis et al., (1989, 1993), Venkatesh and Davis (2000), Thompson et al., (1991), Rogers (1995).
H5	ST	Supply Chain Traceability Application	Kouhi ZBAeh et al., (2021), Leng et al., (2018), Chien (2020), Hastig and Sodhi (2019), de Cremer (2016), Blossey et al., (2019).
H6	BI	Behavioral Intention	Ajzen (1991), Venkatesh et al., (2003, 2012).
H7	PV	Price Value	Venkatesh et al., (2012), Zeithaml (1988), Dodds et al., (1991).
H8	PR	Perceived Risk	Bauer (1960), de Cremer (2016).
H9	BA	Blockchain Application	Miraz et al., (2019), Venkatesh et al., (2012), Puschel et al., (2010), Zhu et al., (2005), Kausar et al., (2017), Kimengsi and Gwan (2017).
H10	ES	Efficiency of Supply Chain Management	Ul-Hameeda et al., (2019), Korpela et al., (2017).

The research questions based on the proposed model include:

*Does the expectation of efficiency (EE) have a positive impact on the application of Blockchain?*

*Does the Expectation of Attempt (EA) have a positive impact on the application of Blockchain?*

*Do facilitating conditions (FC) have a positive impact on the application of Blockchain?*

*Does social influence (SI) have a positive impact on the application of Blockchain?*

*Does supply chain traceability (ST) have a positive impact on the application of Blockchain?*

*Does behavioral intention (BI) have a positive impact on the application of Blockchain?*

*Does price value (PV) have a positive impact on the application of Blockchain?*

*Does perceived risk (PR) have a negative impact on the application of Blockchain?*

*Does the Blockchain application (BA) have a positive impact on supply chain management's (SCM) effectiveness?*

From there, the research team proposes hypotheses according to the following research model:

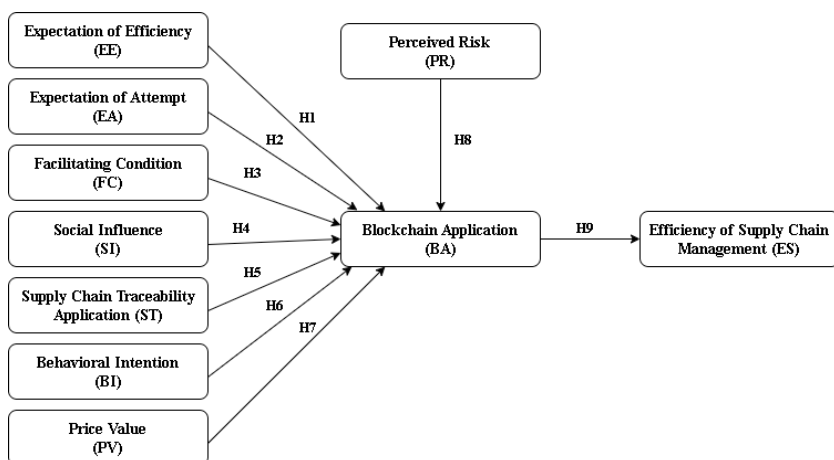


Figure 1: Proposed research model

## 4. RESULTS AND DISCUSSION

### 4.1. Descriptive sample statistics

The study conducted statistical data analysis based on a survey form sent by online in the form of an online questionnaire on Google Form to the survey subjects and also through direct interviews where the responses were recorded on survey forms. The results obtained included 265 survey forms, of which 248 were valid, corresponding to a utilization rate of 83% as research data. At the same time, the survey form was divided into two groups: businesses (148 forms) and individual users (248 forms), with some businesses including individual users in the survey. Through distinguishing characteristics, the description of the research sample shows that:

**Table 2: Description of the research sample for businesses**

Classification Criteria	Instances	Percentage (%)	
What supply chain services does your company or business provide?	Warehousing	42	28.38%
	Domestic transportation	23	15.54%
	Packaging	20	13.51%
	Freight forwarding	17	11.49%
	Shipping costs	14	9.46%
	Documentation	13	8.78%
	Other	19	12.84%
Do you believe that improving the efficiency of supply chain management is crucial for a company or business?	Very important	63	42.57%
	Quite important	32	21.62%
	Important	28	18.92%
	Normal	20	13.51%
	Not important	5	3.38%
How do you evaluate the effectiveness of the supply chain management process in your company or business?	Very effective	20	13.51%
	Quite effective	47	31.76%
	Effective	33	22.3%
	Normal	30	20.27%
	Ineffective	18	12.16%
Do you intend to apply new and modern technologies to improve the efficiency of supply chain management in your company or business?	Very willing to apply	51	34.46%
	Intend to apply	44	29.73%
	Normal	19	12.84%
	Never thought of it	12	8.11%
	Do not want to apply	22	14.86%
Do you know about Blockchain technology?	Know well	30	20.27%
	Have some understanding	49	33.11%
	Heard of it	36	24.32%
	Do not know	21	14.19%
	Not interested	12	8.11%
In your opinion, does the application of Blockchain technology in supply chain management bring more benefits and effectiveness?	Very effective	46	31.08%
	Quite effective	43	29.05%
	Effective	22	14.87%
	Normal	27	18.24%
	Ineffective	10	6.76%

**Table 3: Description of the research sample for individual users**

Classification Criteria	Instances	Percentage (%)	
What is your gender?	Male	127	51.21%
	Female	121	48.79%

What is your age?	Under 19 years old	53	21.37%
	19 - 29	60	24.19%
	30 – 39	40	16.13%
	40 – 49	48	19.35%
	Over 49 years old	47	18.95%
What is your educational level?	University	60	24.19%
	Post-graduate	33	13.31%
	Bachelor's degree	43	17.34%
	Skilled worker	25	10.08%
	Import - export certificate	33	13.31%
	Other	54	21.77%
What is your position in the company?	Director	49	19.76%
	Manager	68	27.42%
	Employee	76	30.65%
	Other	55	22.18%
What supply chain services does your company/ business provide?	Warehousing	57	22.98%
	Domestic transportation	38	15.32%
	Packaging	36	14.52%
	Freight forwarding	28	11.29%
	Shipping costs	27	10.89%
	Documentation	25	10.08%
	Other	37	14.92%
Do you believe that improving the efficiency of supply chain management is crucial for a company/business?	Very important	71	28.63%
	Quite important	42	16.94%
	Important	45	18.15%
	Normal	48	19.35%
	Not important	42	16.94%
How do you evaluate the effectiveness of the supply chain management process in your company/business?	Very effective	45	18.15%
	Quite effective	58	23.39%
	Effective	49	19.76%
	Normal	55	22.18%
	Ineffective	41	16.53%
Do you intend to apply new and modern technologies to improve the efficiency of supply chain management in your company/business?	Very willing to apply	53	21.37%
	Intend to apply	54	21.77%
	Normal	43	17.34%
	Never thought of it	47	18.95%
	Do not want to apply	51	20.56%
Do you know about Blockchain technology?	Know well	46	18.55%
	Have some understanding	57	22.98%
	Heard of it	56	22.58%
	Do not know	48	19.35%
	Not interested	41	16.53%
In your opinion, does the application of Blockchain technology in supply chain management bring more benefits and effectiveness?	Very effective	55	22.18%
	Quite effective	47	18.95%
	Effective	45	18.15%
	Normal	56	22.58%
	Ineffective	45	18.15%

## 4.2. Results

### 4.2.1. Cronbach's alpha test results

Before conducting factor analysis, the research will test the scale's reliability using Cronbach's alpha coefficient with Stata 17 software to assess the reliability of the measurement of effective supply chain management

components and the correlation between observed variables. After performing the Cronbach’s alpha test, the results are summarized in the statistical table of the final testing outcomes for each variable group as follows:

**Table 4: Statistical results of Cronbach’s Alpha test**

No.	Factor	Sign	The first observation variable	The remaining observed variable	Cronbach’s alpha	Discarded variable
1	Expectation of Efficiency	EE	4	4	0.6795	0
2	Expectation of Attempt	EA	4	4	0.7062	0
3	Facilitating Condition	FC	4	3	0.6345	1
4	Social Influence	SI	4	0	0.5955	4
5	Supply Chain Traceability Application	ST	4	4	0.6947	0
6	Behavioral Intention	BI	4	4	0.7395	0
7	Price Value	PV	4	4	0.7003	0
8	Perceived Risk	PR	4	0	0.5567	4
9	Blockchain Application	BA	4	4	0.8348	0
10	Efficiency of SCM	ES	4	4	0.7510	0

(Source: The results of the survey analysis using Stata 17)

The results of Cronbach’s alpha analysis (Table 4) show that the majority of the scales have Cronbach’s alpha coefficients greater than 0.6, and the variable-to-total correlation coefficients are greater than 0.3 (Hair et al., 2010). Therefore, the scales meet the standards and ensure reliability, making them suitable for exploratory factor analysis (EFA).

**4.2.2. Exploratory Factor Analysis (EFA)**

After conducting EFA analysis for the independent variables, some observed variables of the EE, EA, ST, and PV factors did not meet the standard factor locating criteria after performing EFA analysis three times and were thus excluded from the model during the experimental phase.

Finally, based on the third model evaluation table, the study obtained results that satisfied the requirements of the proposed research hypotheses.

**Table 5: Results of the final model evaluation**

Factor	Total Variance Explained						
	Initial Eigenvalues			Extraction Sums of Squared LoBAings			Rotation Sums of Squared LoBAings <sup>a</sup>
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.307	18.375	18.375	2.866	15.924	15.924	1.966
2	2.369	13.161	31.536	2.002	11.124	27.048	2.233
3	2.280	12.669	44.204	1.878	10.436	37.484	2.277
4	1.697	9.427	53.632	1.266	7.034	44.518	1.859
5	1.616	8.980	62.612	1.055	5.860	50.377	1.190
6	1.136	6.311	68.922	.582	3.232	<b>53.610</b>	1.604
7	.758	4.213	73.136				
8	.670	3.722	76.858				
9	.627	3.485	80.342				
10	.612	3.400	83.742				
11	.521	2.892	86.634				
12	.427	2.374	89.009				
13	.412	2.290	91.298				
14	.365	2.026	93.325				
15	.332	1.842	95.167				
16	.324	1.800	96.967				

17	.282	1.568	98.535			
18	.264	1.465	100.000			

Extraction Method: Principal Axis Factoring.

(Source: The results of survey analysis using SPSS)

Based on the table results above, it shows that all observed variables explain 53.61% of the variation in the model (the higher the percentage, the better the model, with a maximum of 100%).

**Table 6: Final rotation results (Pattern Matrix<sup>a</sup>)**

Pattern Matrix <sup>a</sup>						
	Factor					
	1	2	3	4	5	6
ST2	.853					
ST4	.779					
ST3	.759					
EA2		.851				
EA4		.767				
EA1		.695				
BI4			.832			
BI2			.681			
BI1			.567			
BI3			.530			
PV2				.826		
PV1				.755		
PV3				.749		
FC3					.645	
FC1					.597	
FC2					.586	
EE4						.693
EE3						.549

Extraction Method: *Principal Axis Factoring.*  
 Rotation Method: Promax with Kaiser Normalization.  
 a. Rotation converged in 5 iterations.

(Source: The results of survey analysis using SPSS)

The above is the rotated matrix table of observed variables. The results show that all variables meet the standard factor loading criteria and are accepted. No variable loads onto two different factors, and no observed variable is solely separate from a factor. To measure the statistical values of the variables, the groups are divided as follows:

- Group 1 includes variables ST2, ST3, and ST4.
- Group 2 includes the variables EA1, EA2, and EA4.
- Group 3 includes the variables: BI1, BI2, BI3, and BI4.
- Group 4 includes the variables PV1, PV2, and PV3.
- Group 5 includes the variables FC1, FC2, and FC3.
- Group 6 includes variables: EE3, EE4,

**Table 7: Final EFA results for the mediator variables**

KMO and Bartlett's Test	
Kaiser-Meyer-Olkin Measure of Sampling BAequacy.	.808

Bartlett's Test of Sphericity	Approx. Chi-Square	373.391
	df	6
	Sig.	.000

(Source: The results of survey analysis using SPSS)

The KMO index is  $0.808 > 0.5$  and  $\text{Sig.} = 0.000$ ; therefore, it is accepted. All indices in the Communalities table are greater than 0.5, meeting the requirements.

**Table 8: Final EFA results for the dependent variable**

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling BAequacy.		.734
Bartlett's Test of Sphericity	Approx. Chi-Square	258.598
	df	6
	Sig.	.000

(Source: The results of survey analysis using SPSS)

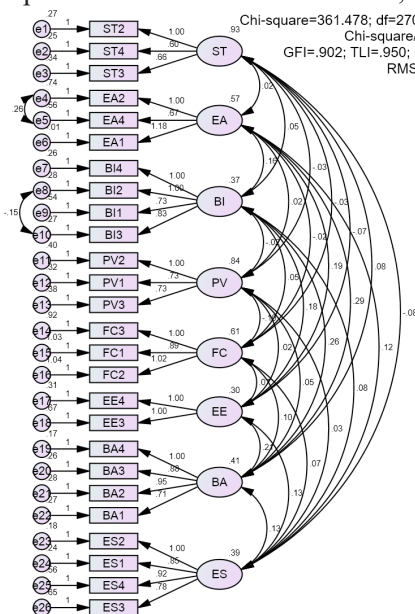
The KMO index is  $0.734 > 0.5$  and  $\text{Sig.} = 0.000$ ; therefore, it is accepted. All indices in the Communalities table are greater than 0.5, meeting the requirements.

Therefore, all criteria in EFA are met to carry out CFA and SEM.

**4.2.3. Confirmatory Factor Analysis (CFA)**

Upon examining the Model Fit indices threshold according to Hair et al. (2010), we found that the CFA model's indices were at the limit before improvement, with  $\text{CMIN}/df = 1.538$  (less than 2);  $\text{TLI} = 0.921$ ;  $\text{CFI} = 0.933$  and  $\text{RMSEA} = 0.047$ . However, the GFI index = 0.888, which according to Hair, a GFI greater than 0.9 is good, but Hair also suggests that the acceptable thresholds for Model Fit indices will vary based on sample size, number of factor groups, and number of observed variables. For a sample size less than 250 as in this study, a GFI value of 0.9 is difficult to achieve. Therefore, the minimum value of 0.8 is still acceptable according to Baumgartner and Homburg (1996), Doll et al. (1994).

Furthermore, the concepts of the error terms are correlated, so the model cannot achieve unidirectional properties (e4 and e5; e8 and e10). By improving the model by connecting variables e4 with e5 and e8 with e10 (Figure 3.1), we obtained a  $\text{CMIN}/df = 1.339$  (less than 2), which is good; a  $\text{TLI} = 0.950$  (greater than 0.9), which is good; and a  $\text{CFI} = 0.958$  (greater than 0.9), which is good. The GFI index is 0.902, which still meets the GFI threshold of 0.9 even though the sample size is less than 250. In addition, the RMSEA index of 0.037 (less than 0.08) is good.



**Figure 2: Results of the CFA limit model**

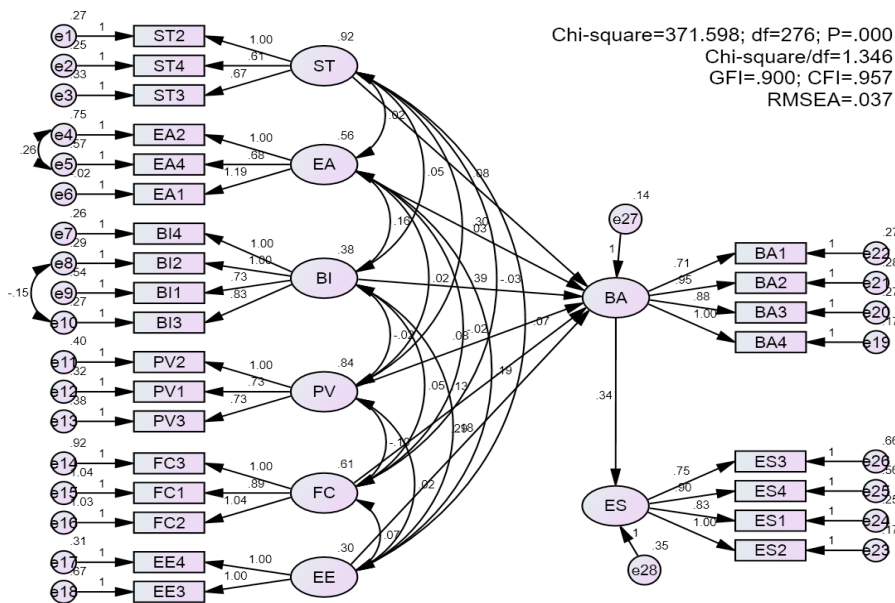
(Source: The results of survey analysis using AMOS)

Note: ST: Supply Chain Traceability Application; EA: Expectation of Attempt; BI: Behavioral Intention; PV: Price Value; FC: Facilitating Condition; EE: Expectation of Efficiency; BA: Blockchain Application; ES: Efficiency of Supply Chain Management

Therefore, CFA for the concepts achieves unidirectional properties, ensures convergence values, ensures reliability, and provides discriminant validity. The research model is suitable for the research data, and the estimation results are statistically significant.

**4.2.4. Linear Structural Equation Modeling SEM Analysis**

The estimated results of the research model (Figure 3) show that the values of CMIN/df = 1.346 (less than 2) are good; CFI = 0.957 (greater than 0.9) is good; and the RMSEA index = 0.037 (less than 0.08) is good. Furthermore, the GFI index of 0.900 still meets the criteria according to Hair et al. (2010), even though the sample size is less than 250. At the same time, the indices of CMIN = 371.598 and df = 276 with a p-value less than 0.05 all meet the requirements. This shows that the linear structural equation model is appropriate and meets the conditions for analysis.



**Figure 3: Results of the SEM model**

(Source: The results of survey analysis using AMOS)

b) Testing research hypotheses using the linear structural equation model

The estimated results of the research model using the SEM show that most of the hypothesized relationships in the formal research model have statistical significance with a p-value less than 0.05, reaching the necessary significance level at 95% confidence. From there, we can construct a regression coefficient table for the research model as follows:

**Table 9: Regression coefficients of the formal research model**

Hypothesis	Relationship	Unstandardized Coefficient	Standardized Coefficient	Standard Error (S.E)	Critical Ratio (C.R)	P-value (P)	Accept/Reject
H1	BA EE	0.290	0.249	0.125	2.322	0.020	Accept
H2	BA EA	0.296	0.347	0.059	5.027	0.000	Accept

H3	BA ← FC	0.129	0.158	0.055	2.341	0.019	Accept
H5	BA ← ST	0.084	0.127	0.038	2.223	0.026	Accept
H6	BA ← BI	0.390	0.375	0.082	4.779	0.000	Accept
H7	BA ← PV	0.078	0.111	0.039	2.007	0.045	Accept
H9	ES ← BA	0.335	0.339	0.074	4.542	0.000	Accept

(Source: The results of survey analysis using AMOS)

### 4.3. Discuss the results of the experiment

Through the results obtained from the data analysis software Stata 17, SPSS, and AMOS, the study shows that:

Firstly, the adoption of Blockchain technology (BA) is influenced by the variables of expected efficiency (EE), expected effort (EA), favorable conditions (FC), supply chain traceability application (ST), behavioral intention (BI), and price value (PV), and this intermediate variable has an impact on the dependent variable, supply chain management efficiency (ES). Specifically, the preliminary evaluation of the scale of variables in the proposed research model shows that the variables EE, EA, FC, ST, BI, PV, BA, and ES have Cronbach’s alpha coefficients greater than 0.6, satisfying the reliability requirement. However, two variables, social influence (SI) and perceived risk (PR), are eliminated due to Cronbach’s alpha coefficients being less than 0.6. With the exploratory factor analysis (EFA), the results show that there are six factor groups, and the basis of this division or reduction is based on the linear relationship of factors with observed variables. At the same time, the total extracted variance value is determined to be 53.61%. After determining the six representative factor groups, the study conducted a confirmatory factor analysis (CFA) to test the suitability of the factor groups with the theory. The CFA results show that the concepts are unidirectional, ensuring convergence, reliability, and discriminant validity. Finally, the study tested the model and hypotheses using structural equation modeling (SEM). Based on the standardized estimation weights, the study retained the independent variables EE, EA, FC, ST, BI, and PV. These six variables have a combined and explanatory effect of 66.8% on the decision to adopt Blockchain, in which the normalized regression coefficient of BI is the largest at 0.375, indicating that BI has the greatest impact on the variable BA. Similarly, the intermediate variable BA explains 11.5% of the variation in supply chain management efficiency (ES). It can be concluded that the expected efficiency, expected effort, favorable

Secondly, regarding the positive impacts of the factors on businesses, the Expectation of Efficiency (EE) factor indicates that companies managing supply chains in Hanoi expect that the application of Blockchain will bring high supply chain management efficiency. They believe that if contracts can be signed early without knowing each other, the market will be very efficient through smart contracts. They are excited that in the future, negotiations and contract signing can be automated through the transport management system and supply chain management system linked together. This can help companies increase productivity and optimize their supply chain management time. This result corresponds to the study by Blossey et al., (2019), who found that the Blockchain-based supply chain coordination system is an innovation. Regarding the Expectation of Attempt (EA) factor, it has been shown that companies managing supply chains in Hanoi have a positive attitude towards Blockchain technology, even if they only have theoretical knowledge of it. These companies have acknowledged the importance and advantages of Blockchain in the future. They have shown interest in learning about processing and operating procedures when using Blockchain technology to enhance efficiency and minimize risks in supply chain management processes. In addition, the Facilitating Condition (FC) factor also brings positive values to companies when they have advantages



in resources, knowledge, and serious investment in infrastructure and technical support, especially the information technology system in the company, to meet the needs of Blockchain operations and solve difficulties in supply chain management processes. However, these are just conclusions drawn from the research scale, and there is no solid evidence to show that these conclusions will hold true on a larger scale. Therefore, further research is needed to provide more accurate and precise findings.

Conditions, supply chain traceability application, behavioral intention, and price value have a direct impact on the decision to adopt Blockchain technology by companies in supply chain management activities in Hanoi at different levels.

Thirdly, regarding the existing practical issues, the results of the impact assessment of the application of Blockchain show that companies managing supply chains in Hanoi are only observing Blockchain technology and the market. These companies are mainly in a waiting position, and most of them do not fully understand the use of Blockchain technology. Most of the supply chain management companies in Hanoi are still uncertain about which processes should be implemented with the help of Blockchain technology. The research suggests that these companies should focus more on Blockchain technology and identify their own use cases since there is no available model or field applicable to each supply chain service provider. All supply chain service companies in Hanoi evaluate Blockchain technology positively rather than negatively. However, according to Kühn et al., (2019), the level of readiness for change may vary among companies of different sizes. The study by Kühn et al., (2019) found that larger companies are more involved in applying Blockchain technology. These companies eliminate individual use cases and develop Blockchain more in cooperative projects with partners. Therefore, this research does not consider the scale factor of companies and its impact on the application of Blockchain.

In summary, Blockchain technology has shown promising results in improving the supply chain network in recent applications, deeply impacting society and lifestyles by reshaping many business and industrial processes. In an effort to explore the integration of Blockchain technology in supply chain management, especially on e-commerce platforms, this study uses a linear SEM model and a UTAUT model to identify the impacts of Blockchain technology on enhancing supply chain management efficiency on the Shopee.vn e-commerce platform. The results show that the expectation of efficiency, expectation of attempt, facilitating condition, supply chain traceability application, behavioral intention, and price value have a proportional impact on supply chain management efficiency.

## **5. CONCLUSION AND POLICY IMPLICATIONS**

In the Industry 4.0 era, Blockchain technology is an effective solution for tracking the information of goods and services and enhancing operational efficiency in management activities at companies applying supply chain management. With outstanding advantages of immutability, data transparency, and security, applying Blockchain is considered a modern and smart trend in this era.

Based on the research results and testing of the normalized regression coefficients, which were obtained in order and influence level, including behavioral intention 0.375, expectation of attempt 0.347, expectation of efficiency 0.249, facilitating condition 0.158, supply chain traceability application 0.127, price value 0.111, and Blockchain application 0.339, the authors propose some implications for users, businesses using the supply chain in Hanoi, as well as for state agencies in the application of Blockchain technology to enhance the efficiency of supply chain management.

*In terms of the implications for users:* Firstly, users should be trained and educated on supply chain management processes, information security, and confidentiality requirements to ensure the accuracy

and transparency of data when using Blockchain. Secondly, standards for information authentication, information security, and data integrity can be established to ensure that users comply with the procedures and standards in supply chain management. Thirdly, the activities of users can be checked and monitored to detect unusual or invalid activities using Blockchain technology. Fourthly, users need to learn how to deal with problems when managing the supply chain using Blockchain technology. Finally, in order to ensure the effectiveness and reliability of the supply chain management system, users should build a community that promotes cooperation and consensus in managing the supply chain through Blockchain technology and hold events that encourage stakeholder engagement.

*In terms of the implications for businesses using supply chains:* Firstly, businesses need to thoroughly understand the working mechanism of Blockchain, the relationship between business interests, and the technical feasibility of Blockchain in order to find a reasonable business model and apply it appropriately to the actual conditions of the business. Secondly, in order to avoid the conflict and difficulty of unifying blocks in this technology, businesses should cooperate closely and build a single Blockchain solution. Thirdly, with the quality of information technology infrastructure being increasingly improved, automation and data digitization are the first steps for businesses to take advantage of Blockchain technology. Finally, due to the influence of COVID-19, digital transformation is the focus and goal of the government, so this is an opportunity for businesses to transform and improve their competitiveness in the world market.

*In terms of the implications for state agencies:* Firstly, the state agencies need to consider promulgating a legal corridor for new technologies to attract and promote domestic and foreign technology projects. Secondly, they need to pay attention to reducing complicated procedures to encourage businesses to make breakthroughs and progress by applying technology to their operations and management processes. Thirdly, they should prioritize promoting the research movement of some core technologies in which Vietnam has advantages and strong breakthroughs, such as AI, Blockchain, big Data... Finally, the state should support the promotion of Blockchain technology as well as corresponding reference models to improve the efficiency of supply chain operations in Vietnam.

In summary, with the topic “*Application of the SEM model to evaluate the effectiveness of supply chain management using Blockchain technology: a study on the Shopee.vn marketplace*”, the authors have completed the initial objectives, including: Firstly, the authors presented the theoretical framework of Blockchain technology, supply chain management, and the e-commerce platform Shopee.vn. Secondly, the survey on the application of Blockchain technology in the supply chain management of businesses, which is on the e-commerce platform Shopee.vn, showed that most businesses still face many limitations in terms of scale, capital, experience, and management qualifications. Thirdly, the authors proposed a research model and related hypotheses about the factors affecting the application of Blockchain technology in enhancing the efficiency of supply chain management. Fourthly, the authors conducted a survey and analyzed the results of the research model for users and businesses on Shopee.vn in an effort to apply Blockchain technology to their supply chains. Finally, through the research results, the authors presented the benefits and opportunities that Blockchain brings to business, pointed out the current limitations, and boldly stated some proposals to enhance the application of Blockchain technology in SCM in general.

Despite trying to perfect the research, the study still has some limitations, such as a small sample size (248 observed samples), the scope of the research being only in Hanoi, and the field being only on Shopee.vn. Therefore, future research could focus on solving the limitations of sample size, expanding the scope of research in many provinces, researching in other fields such as stock exchanges, other popular e-commerce platforms in Vietnam like Tiki, Lazada, etc., or expanding research on the impact of company size on Blockchain adoption, on the impact of Blockchain on different types of companies, etc.

## APPENDIX

### SURVEY FORM

#### APPLICATION OF SEM MODEL TO EVALUATE THE EFFECTIVENESS OF SUPPLY CHAIN MANAGEMENT USING BLOCKCHAIN TECHNOLOGY: A study on the Shopee.vn marketplace

Dear Sir/Madam,

We are second-year students from the Faculty of Information Technology and E-Commerce at the University of Commerce. We are currently conducting a scientific research project on “*Application of the SEM model to evaluate the effectiveness of supply chain management using Blockchain technology: A study on the Shopee.vn marketplace*”.

The authors of this survey aim to investigate the factors that influence the effectiveness of supply chain management using Blockchain technology. Our goal is to create a premise for businesses to develop and manage their supply chain structure with higher efficiency. Therefore, we would greatly appreciate it if you could take 3-5 minutes to complete this survey honestly and seriously. Your opinions are valuable and meaningful to us and will help us obtain the most objective and accurate evaluation. We assure you that all information you provide will be kept confidential and used solely for research purposes. If needed, we are willing to provide a summary report of this survey for your reference. We deeply appreciate your enthusiastic support and assistance!

*Thank you very much for your time and cooperation!*

#### A. INDIVIDUAL INFORMATION

Please provide the following information to serve the research process:

1. What is your gender?

- Male
- Female

2. What is your age?

- Under 19 years old
- 19 - 29
- 30 – 39
- 40 – 49
- Over 49 years old

3. What is your educational level?

- University
- Post-graduate
- Bachelor’s degree
- Skilled worker
- Import - export certificate
- Other

4. What is your position in the company?

- Director
- Manager
- Employee
- Other

5. What supply chain services does your company/business provide?

- Warehousing
- Domestic transportation
- Packaging
- Freight forwarding
- Shipping costs
- Documentation
- Other

### **B. SUPPLY CHAIN MANAGEMENT ACTIVITIES INFORMATION**

Please answer some questions for the dependent variable “*behavioral intention*”:

1. Do you believe that improving the efficiency of supply chain management is crucial for a company/business?

- Very important
- Quite important
- Important
- Normal
- Not important

2. How do you evaluate the effectiveness of the supply chain management process in your company/business?

- Very effective
- Quite effective
- Effective
- Normal
- Ineffective

3. Do you intend to apply new and modern technologies to improve the efficiency of supply chain management in your company/business?

- Very willing to apply
- Intend to apply
- Normal
- Never thought of it
- Do not want to apply

4. Do you know about Blockchain technology?

- Know well

- Have some understanding
- Heard of it
- Do not know
- Not interested

5. In your opinion, does the application of Blockchain technology in supply chain management bring more benefits and effectiveness?

- Very effective
- Quite effective
- Effective
- Normal
- Ineffective

**C. FACTORS AFFECTING THE EFFECTIVENESS OF SUPPLY CHAIN MANAGEMENT USING BLOCKCHAIN TECHNOLOGY**

Using a 5-point Likert scale with the following conventions for each level:

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
①	②	③	④	⑤

Question	1	2	3	4	5
<b>H1: The "Expectation of Efficiency" factor</b>					
1.1. Using Blockchain technology will increase opportunities for businesses.					
1.2. Applying Blockchain technology significantly improves the quality of supply chain management processes.					
1.3. Applying Blockchain technology significantly increases the efficiency of my work.					
1.4. Applying Blockchain technology increases the effectiveness of SCM.					
<b>H2: The "Expectation of Attempt" factor</b>					
2.1. Learning to use Blockchain technology does not take much time.					
2.2. Business processes using Blockchain technology are easy to use.					
2.3. The application of Blockchain technology in SCM is flexible and interactive.					
2.4. The SCM process using Blockchain technology is simple and easy to understand.					
<b>H3: The "Facilitating Condition" factor</b>					
3.1. I have the necessary resources to use Blockchain technology.					
3.2. I have the necessary knowledge to use Blockchain technology.					
3.3. Blockchain technology is compatible with other systems I am using.					
3.4. A department (or a group of employees) in the SCM operation is always ready to support with difficulties related to the application of Blockchain technology.					
<b>H4: The "Social Influence" factor</b>					
My decision to use Blockchain technology may be influenced by the following groups:					
4.1. People who are important to me.					
4.2. People on social media (Facebook, TikTok, etc.) sharing about Blockchain technology.					
4.3. Top-level managers in SCM operations.					
4.4. Investors for my business.					
<b>H5: The "Supply Chain Traceability Application" factor</b>					
5.1. The information retrieved from Blockchain is accurate.					
5.2. Retrieving information from Blockchain takes less time.					

5.3. Retrieving information from Blockchain helps build trust with customers.					
5.4. Retrieving information from Blockchain helps to better manage the production process in real-time.					
H6: The "Behavioral Intention" factor					
6.1. I will use Blockchain technology for the benefits it brings to SCM.					
6.2. I believe that applying Blockchain technology in my business is a right decision.					
6.3. I believe that my business will continue to use Blockchain technology.					
6.4. I see Blockchain as suitable for the SCM process of businesses.					
H7: The "Price Value" factor					
7.1. The cost of implementing Blockchain technology is appropriate for the revenue of the business.					
7.2. Blockchain technology has a lower implementation cost compared to other technologies.					
7.3. At the current price, Blockchain provides more value than not using Blockchain.					
7.4. My business cannot afford the operational costs of implementing Blockchain technology in the SCM process.					
H8: The "Perceived Risk" factor					
8.1. Applying Blockchain is vulnerable to hacker attacks.					
8.2. It is difficult to change incorrect information when applying Blockchain technology.					
8.3. Blockchain has many security keys that I cannot remember.					
8.4. It is difficult to operate SCM processes using Blockchain technology.					
H9: The "Blockchain Application" factor					
9.1. I will frequently use Blockchain technology if my business implements this new technology.					
9.2. I will use Blockchain technology to process current business operations.					
9.3. Applying Blockchain technology in SCM operations will solve most traditional business operations.					
9.4. Using Blockchain technology can reduce transaction costs for businesses.					
H10: The "Efficiency of Supply Chain Management" factor					
10.1. The supply chain will operate effectively if there is a balance between product, customer, and transportation factors.					
10.2. Proper business strategies will bring good efficiency to the supply chain.					
10.3. The supply chain needs to be continuously upgraded in many aspects to maximize benefits for all parties involved.					
10.4. Choosing appropriate criteria for the business while keeping the risks low will help increase the effectiveness of supply chain management.					

*Thank you very much for completing the survey! Wishing you a day full of joy and positive energy!*

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## RESEARCH FACTORS AFFECTING EMOTIONAL INTELLIGENCE ON THE RESULTS OF STUDIES ON STUDENTS IN SOME UNIVERSITIES IN HANOI CITY

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*ABSTRACT: Emotional intelligence is often talked about in terms of human emotions and states, but in the developing technology era, the influence of technology devices and digital platforms has made the role of personal emotions more important. change multiplier. In this study, the research team used a quantitative method based on four factors: emotional intelligence, self-control, sociability, and happiness, to determine the influence of emotional intelligence or happiness. The emotional intelligence of students towards learning and research results at some universities in Hanoi is based on the collection of actual data from students with different majors in Hanoi combined with analysis using SPSS. The results of the analysis show that all four factors affect the academic and research results of students in both economic and technical disciplines. Among them, self-control and emotional well-being had the greatest influence. Based on the results of the study, the group offers a number of implications to support the development of each individual's emotional intelligence, improve learning efficiency, and increase feelings of happiness in students. In today's world, life is full of pressures and impacts from technological devices and technical applications.*

**Keywords:** *emotional intelligence; sympathy; self-control; sociability; well-being.*

### 1. INTRODUCTION

Many people think that emotions only play a role in love relationships or provoke people to increase arousal and explosiveness. In reality, however, emotions are everywhere: they shape our decisions, help us make sense of the world, and play an important role in any of our interactions with people (Daniel, 2008).

The success in both one's professional and personal lives has been largely attributed to one's level of education. The primary goals of education systems around the world include fostering in students' scientific knowledge, creative thinking, analytical thinking, and reasoning (Abdolrezapour and Tavakoli, 2012); (Petrides and Furnham, 2003). Furthermore, these models undoubtedly led to the training of people with high information quotients. However, educational and psychological researchers argue that this is not a flawless or ideal result. Views and attitudes regarding the role of intellect in forecasting human success have been altered by the idea of emotional intelligence. Numerous studies have been conducted and shown that an individual's emotional intelligence quotient accurately predicts their potential in both their professional and personal lives.

Emotions play a key role in the brain's ability to reason and think, according to a neuroscience study. Some Western Nations hold the belief that an increased emotional quotient is related to increased knowledge and professional education. Instead of focusing just on professional knowledge as in the past, tests are now included in the hiring process to assess emotional intelligence (Daniel Goleman, 2007; 2008). Due to this, several studies on emotional intelligence expressions, particularly those of students, have been conducted

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in our nation. According to certain research, most students function at an average or below average level when it comes to emotional intelligence, whereas a select few perform at a high or extremely high level. The fact that pupils' knowledge of emotional intelligence has not been updated is one of the causes of this issue. On the other hand, the existing educational system has not paid much attention to ways to improve pupils' emotional indices during the learning process at school, (Andrea & Ali, 1996; Dulewicz & Higgs, 2000; Daniel, 2008; Bar-On, 2006; Santos et al., 2022; Gurbuz et al., 2016).

As a result, the study of students' awareness of emotional intelligence is both to assess the effectiveness of training and to help students understand the reality of their emotional intelligence. From here, students can plan their study, practice, and develop their ability to think emotionally and apply it to their lives and learning processes, preparing for their future careers (Udayar et al., 2020; Santos et al., 2022)

We settled on the subject of "*Research Factors Affecting Emotional Intelligence on The Results of Studies on Students in Some Universities in Hanoi City*" to identify the impacts of emotional intelligence on the results of studies on students. In this study, the research team used a quantitative method based on four factors: emotional intelligence, self-control, sociability, and happiness, to determine the influence of emotional intelligence or happiness. The emotional intelligence of students towards learning and research results at some universities in Hanoi is based on the collection of actual data from students with different majors in Hanoi combined with analysis using SPSS. The paper included parts: The theoretical foundation, the findings of the research, potential applications, and a conclusion.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Intellect, Emotional and Emotional intelligence**

Intelligence is a person's potential for adaptation. Many psychologists agree that this is the most prevalent definition. Take this example: W. S. Stern says intelligence is the general capacity of a person to deliberately focus his or her mind on new requirements. This is the capability of the general mind to adjust to new tasks and circumstances in life: Gardner sees intelligence as a capacity for problem-solving that results in goods that are valuable in the cultural environment, (Howard, 1999). In conclusion, it may be concluded from the viewpoints of psychologists of mind that: Intelligence is a relatively autonomous cognitive quality of personality, the core of which is the capacity for abstract thought; Cultural and historical restrictions have an impact on intelligence. The main function of intelligence is to ensure proper interaction with its surroundings (Bradberry & Greaves, 2005; Udayar et al., 2020)

Emotions are a person's vibrations toward another person, an event, or any other phenomenon in life. The Vietnamese dictionary defines emotion as a psychological reflection of a direct experience of the life meaning of particular phenomena and situations through the relationship between their objective attributes and the needs of the subject. There is no single definition for emotion. Emotions emerged as a way for organisms to assess the biological relevance of body states and environmental factors during the course of evolution. Fecht Russell, a psychologist, stated in 1996 that "emotions are things that everyone knows but cannot define." (Bar – On, 1997; Bar-On, 2006). This psychologist contends that although we all understand how to communicate our emotions, they cannot be precisely and broadly defined, (Salovey & Mayer, 1997; Dulewicz & Higgs, 2000);

When studying the word and the exercises, there is considerable disagreement over the meaning of emotional intelligence. Emotional intelligence was first defined by (Salovey & Mayer, 1990) as "the ability to monitor one's own and other people's feelings and emotions, distinguish between them, and use this information to inform one's thoughts and actions." The precise concept of this construction is still unclear despite this early definition. They are so erratic, and fields are expanding so quickly, that definitions are

frequently altered by academics since the ability model, the mixed model, and the particular model are the three main models of emotional intelligence in use today.

## **2.2. Effects of Emotions on students**

In addition to examining emotions and their various forms, researchers also look at how emotions impact their subjects. Positive or negative emotions themselves have had favorable or unfavorable results. Even negative feelings, when expressed with the right intensity, can encourage students to take initiative, be positive, and adjust to their learning and training environment (Goleman et al., 2013). Specifically impacting students' psychological well-being, learning and training, and social interactions, positive emotions make learners excited and interested and give better learning results, while negative emotions can lead to an uncooperative state, make the lesson difficult to absorb, or lead to rejection of the lesson (Udayar et al, 2020; Nguyen, 2018; Le, 2021).

Emotional intelligence is essential for students, as it will help them better perceive and manage their feelings and support learning and research in different disciplines. For example, it helps learners increase their ability to recognize and correctly identify their current feelings to help them control their emotions. Studies show that people who are unable to recognize their own feelings are more likely to erupt in violence and have difficulty being receptive to conflicting opinions. (Daniel, 2013; Udayar et al, 2020).

In addition, enhancing emotional intelligence helps learners manage feelings and will help them focus on accomplishing goals better. For example, even though the subject is boring, learners can still try to look at it from a different angle. Maybe a certain topic will interest learners. Students who can organize their work in this way often do well in school, even if they have a low IQ (Daniel, 2013; Udayar et al, 2020; Nguyen, 2018; Le, 2021)

## **2.3. Related works**

When it comes to learning, emotional intelligence has a significant impact on the process, which is particularly evident in the learning attitude. Making progress in learning is impossible or challenging if the attitude toward learning is negative. Due to inadequate family education on emotions or family conflicts that cause children to be emotionally deviant, children who commit crimes, engage in violent behavior, exhibit hostility, or become involved in societal ills are partially caused by emotions. (Gurbuz et al., 2016; (Bradberry & Greaves, 2005; Udayar et al, 2020) said that Emotions are tough to generate if they aren't taught early on and are incapable of being controlled. Students can learn emotional intelligence in a variety of ways, starting at a young age. Relationship between emotional intelligence and other complementary learning activities: high academic achievement requires the ability to listen and focus attention, control impulses, and feel responsible for one's own learning; emotional intelligence facilitates teachers' ability to carry out their teaching duties.

When used in the workplace, emotional intelligence enables individuals to operate with great efficiency, manage tasks skillfully, and produce work of the highest caliber (Santos et al., 2022). Being able to identify emotions, produce them, and manage or control them are all characteristics of a good communicator. People who always live in peace with others and who take their work seriously are more likely to succeed in both work and life, (Udayar et al., 2020). Emotional intelligence is a key component of leadership skills, which enable people to operate more efficiently (Nguyen, 2018; Le, 2021; Ngui and Lay, 2020).

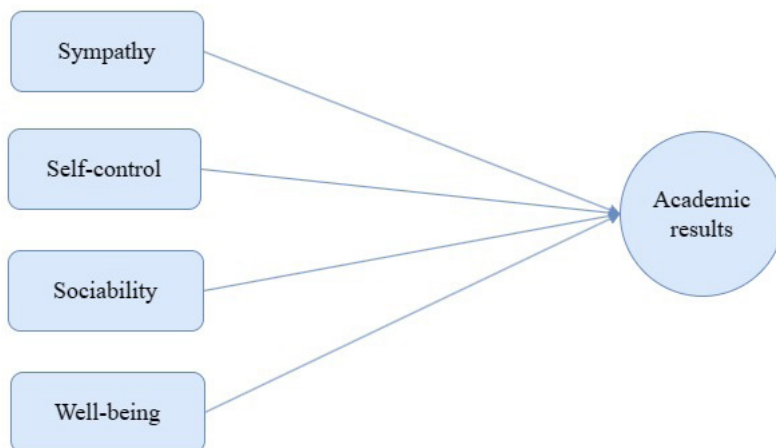
## **2.4. The proposes research model**

First, the authors put together a list of factors included in the emotional intelligence model of domestic studies. From this, the following table can be built:

**Table 1: Summary table of factors in the emotional intelligence model**

Factor 1	Factor 2	Factor 3	Factor 4	Another factor	Model references
Self-awareness	Self-Management	Enthusiasm	Persist	Self motivation	(Andrea & Ali, 1996); (Dulewicz & Higgs, 2000); (Daniel , 2007); (Daniel , 2008); (Goleman et al., 2013)
Self-control	Sympathy	Sociability	Well-being		(Bar – On, 1997); (Bar-On , 2006) (Santos et al., 2022)
Emotional awareness	Use emotions	Understanding emotions	Control your emotions		(Salovey & Mayer, 1990); (Andrea & Ali, 1996); (Gurbuz et al., 2016). (Bradberry & Greaves, 2005) (Udayar et al., 2020)
Sympathy	Self-control	Sociability	Well-being		(Salovey & Mayer, 1997); Dulewicz & Higgs, 2000); (Duong Thi Hoang Yen, 2008); (Hamdy et al., 2014). (Nguyen Thi Thanh Huyen, 2018), (Le Bich Ngoc, 2021) (Ngui and Lay, 2020)

From the (Daniel, 2007; Bar – On, 2006; (Salovey & Mayer, 1990; 1997) we have selected the factors that are most suitable for the study: sympathy, self-control, sociability, and well-being. Because these factors are general and appear in many previous studies.



**Figure 2: Proposed research model**

**3. RESEARCH METHOD**

This study combines qualitative and quantitative research. For qualitative research, it first builds and strengthens a theoretical research model through existing research and behavioral research models. For quantitative research, the study was carried out through the data collection of live survey questionnaires and online questionnaires, and we used a 5-point Likert scale: 1 being completely disagreed, 2 being disagreed, 3 being neutral, 4 being agreed, and 5 being completely agreed.

The research conducted quantitative research by collecting data from surveys and questionnaires, processing it through SPSS software, and using the following technology to evaluate the data: descriptive analysis, Cronbach’s alpha test, EFA exploratory analysis, and regression analysis.

**4. RESULTS AND DISCUSSION.**

**4.1. Descriptive sample statistics**

The study used statistical data from the survey, which was delivered to the survey subjects online as a query on a Google form and then asked straight into the survey form. There are 302 valid responses in the findings. Survey forms are categorized using identifying signals, which demonstrate:

**Table 2: Description of the study sample**

Classification Criteria		Amount of people	Proportion (%)
What year are you a student?	First year	60	19,9%
	Second year	67	22,2%
	Third year	81	26,8%
	Final year	94	31,1%
What is your gender?	Male	142	47,0%
	Female	160	53,0%
Are you a major student?	Economics	80	26,5%
	Technology	61	20,2%
	Education	67	22,2%
	Language	59	19,5%
	Other	35	11,6
What school are you a student of?	Thuongmai University	59	19,5%
	Vietnam National University	71	23,5%
	HaNoi University of Science and Technology	50	16,6%
	FPT University	59	19,5%
	Other	63	20,9%

**4.2. Results**

**4.2.1. Cronbach’s alpha test**

The study will test the scale using the Cronbach’s alpha tool in SPSS software version 20.0 to determine its reliability and the connection between the observed variables and the service quality components before proceeding with factor analysis. The results of the Cronbach’s alpha test are described in the statistical table below for each group of variables’ final test results:

**Table 3: Statistical results of Cronbach’s Alpha test**

No	Factor	Symbol	First observation variable	The remaining observed variable	Cronbach’s Alpha	Discarded variable
1	Sympathy	DC	8	7	0,846	1
2	Self-control	KS	8	8	0,864	0
3	Sociability	HD	6	6	0,843	0
4	Well-being	HP	6	6	0,825	0
5	Academic results	KQ	5	5	0,814	0

*(Source: Analysis results of questionnaires using SPSS)*

All variables have Cronbach’s alpha coefficient higher than 0.8. So put the variables in the EFA factor analysis.

**4.2.2. Exploratory Factor Analysis (EFA)**

EFA analysis for the independent variable: after performing EFA analysis twice, the study obtained results that satisfy the requirements of the proposed research hypotheses.

**Table 4: Final model evaluation results**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.513	27.138	27.138	6.513	27.138	27.138	3.595	14.978	14.978
2	2.428	10.117	37.255	2.428	10.117	37.255	3.239	13.496	28.475
3	2.103	8.763	46.017	2.103	8.763	46.017	3.232	13.467	41.942
4	1.851	7.712	53.730	1.851	7.712	53.730	2.829	11.788	53.730
5	.868	3.617	57.347						
6	.770	3.208	60.555						
7	.753	3.137	63.692						
8	.710	2.957	66.649						
9	.696	2.899	69.548						
10	.667	2.777	72.325						
11	.662	2.758	75.083						
12	.600	2.500	77.583						
13	.577	2.404	79.987						
14	.557	2.322	82.309						
15	.523	2.180	84.489						
16	.505	2.103	86.591						
17	.488	2.034	88.625						
18	.464	1.933	90.558						
19	.439	1.828	92.386						
20	.405	1.687	94.073						
21	.396	1.651	95.724						
22	.368	1.535	97.259						
23	.335	1.395	98.654						
24	.323	1.346	100.000						

(Source: Analysis results of questionnaires using SPSS)

Based on the results of the above table, all observed variables explain 53.730% of the variation of the model (the higher the percentage, the better the model; the highest is 100%).

**Table 5: Rotated Component Matrix the last time**

	Component			
	1	2	3	4
KS2	.720			
KS3	.703			
KS1	.693			
KS4	.692			
KS8	.685			
KS6	.679			
KS5	.649			
DC8		.751		
DC5		.712		
DC2		.696		
DC6		.690		
DC4		.682		
DC3		.679		
HP1			.747	
HP6			.724	
HP5			.713	

HP4			.681	
HP3			.680	
HP2			.645	
HD1				.767
HD2				.737
HD6				.730
HD4				.699
HD5				.644

Extraction Method Principal Component Analysis

Rotation Method Varimax with Kaiser Normalization

a. Rotation converged in 6 iterations

(Source: Analysis results of questionnaires using SPSS)

Above is the rotation matrix table of the observed variables. The results show that all variables ensure the standard load factor, so they are accepted. No variable loads up to two different factors at the same time, and no observed variable is on a single factor.

**Table 6: EFA analysis results for the last dependent variable**

<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</b>		<b>.845</b>
Bartlett's Test of Sphericity	Approx. Chi-Square	442.371
	df	10
	Sig.	.000

(Source: Analysis results of questionnaires using SPSS)

KMO index = 0.845 > 0.5 and Sig. = 0.000 should be accepted. The indexes in the Communalities table are all greater than 0.4, so they are satisfactory.

**Table 7: Total Variance Explained for the last dependent variable**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.867	57.342	57.342	2.867	57.342	57.342
2	.614	12.282	69.624			
3	.532	10.633	80.257			
4	.524	10.475	90.733			
5	.463	9.267	100.000			

Extraction Method: Principal Component Analysis.

(Source: Analysis results of questionnaires using SPSS)

**Table 8: Rotated Component Matrix for the last dependent variable**

	Component
	1
KQ4	.786
KQ3	.762
KQ1	.754
KQ5	.748
KQ2	.735
Extraction Method: Principal Component Analysis.	
a. 1 components extracted.	

(Source: Analysis results of questionnaires using SPSS)

This is a successful outcome for the scale in terms of ensuring unidirectionality. The observed variables are not omitted since the indexes in the rotation matrix table are adequate.

### 4.2.3. Correlation analysis

The purpose of running Pearson correlation is to test the close linear correlation between the dependent variable and the independent variables because the condition for regression is first to be correlated. In addition, the problem of multicollinearity arises when the independent variables are also strongly correlated with each other. The suspicious sign is based on the Sig value. The correlation between the independent variables is less than 0.05, and the Pearson correlation value is greater than 0.3.

**Table 9. Correlations**

		KQ	DC	KS	HD	HP
KQ	Pearson Correlation	1	.533**	.579**	.556**	.579**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	302	302	302	302	302
DC	Pearson Correlation	.533**	1	.298**	.367**	.328**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	302	302	302	302	302
KS	Pearson Correlation	.579**	.298**	1	.329**	.383**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	302	302	302	302	302
HD	Pearson Correlation	.556**	.367**	.329**	1	.360**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	302	302	302	302	302
HP	Pearson Correlation	.579**	.328**	.383**	.360**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	302	302	302	302	302

\*\* . Correlation is significant at the 0.01 level (2-tailed).

(Source: Analysis results of questionnaires using SPSS)

The Pearson correlation of independent variables DC, KS, HD, and HP with the dependent variable KQ is less than 0.05 (=0.00). The independent variables KS, HP, and KQ have the strongest correlation with the r coefficient of 0.579, and the DC independent variable with the dependent variable KQ has the weakest correlation with the loading coefficient of 0.533.

The pairs of independent variables have a fairly strong correlation with each other, so there is a possibility of multicollinearity.

### 4.2.4. Regression analysis

**Table 10: Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.464	.192		-2.415	.016		
	DC	.265	.042	.253	6.355	.000	.804	1.244
	KS	.328	.042	.310	7.750	.000	.794	1.259
	HD	.264	.041	.259	6.390	.000	.776	1.289
	HP	.294	.042	.284	6.969	.000	.767	1.304

Dependent Variable: KQ

Predictors: (Constant), DC, KS, HD, HP

(Source: Analysis results of questionnaires using SPSS)

The sig value of independent variables HP, DC, KS, and HD is less than 0.05; independent variables have an impact on the independent variable. The VIF column is used to check for multicollinearity.

Theoretically, if VIF is less than 10, multicollinearity will not occur. However, in fact, research models using Likert scales have shown that a VIF less than 2 will not have multicollinearity occurring between independent variables. Here, the coefficients of magnification of variance are all less than 2, so there is no multicollinearity.

The regression coefficients of the variables HP, DC, KS, and HD are all larger than 0, so these variables all have the same effect as the dependent variable. Based on the size of the normalized regression coefficient Beta, the order of magnitude of the impact from the strongest to the weakest of the independent variables on the dependent variable KQ is: KS (0.310) > HP (0.284) > HD (0.259) > DC (0.253). The variable that has the strongest impact on the dependent variable is self-control; the second strongest variable on learning outcomes is well-being; the third impact variable is sociability; and the fourth variable is sympathy.

We have the normalized regression equation:

$$KQ = 0.310*KS + 0.284*HP + 0.259*HD + 0.253*DC + e.$$

$$Academic\ results = 0.310*Self-control + 0.284*Well-being + 0.259*Sociability + 0.253*Sympathy + e$$

We obtain the normalized residual frequency histogram and the Normal P-P Plot as Figure 1 and Figure 2. From the graph above, we see a normal distribution curve superimposed on the histogram. This curve is bell-shaped, which is consistent with the graph of the normal distribution. The mean is close to 0, and the standard deviation is 0.993, which is close to 1. It can be said that the distribution is almost normal. Therefore, it can be concluded that the residual distribution assumption is not violated.

With the P-P plot, the percentiles in the distribution of the residuals will cluster into a diagonal. Thus, it does not violate the regression assumption about the residual normal distribution. The scatter plot tests the assumption of linear contact.

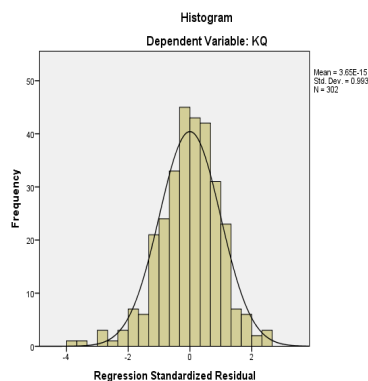


Figure 1: Histogram

(Source: Analysis from SPSS)

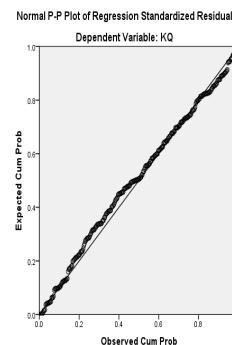


Figure 2: Normal P-P Plot

(Source: Analysis from SPSS)

### 4.3. Discussion

Firstly, through the results obtained from the SPSS data processing software, the study shows that:

Students should have a positive outlook and be confident in their ability to control their emotions in order to improve their learning outcomes, since the factor “self-control” has the biggest impact on students’ learning outcomes. Students must develop a scientific study plan for themselves, become more engaged in their education, constantly seek out new information, and thoroughly understand what they have learned. Students need to allow themselves time to unwind without being confined in addition to studying. Limits should be set with impetuous thoughts, and students should give themselves time to reflect because doing so



will enable them to reconsider their own behavior from the perspective of others. Spend some time observing and comprehending your feelings so that you can identify times when you are stressed, anxious, or furious. It will be easier for you to control your emotions if you have knowledge of them. Find a method to see the issue positively and come up with workable solutions rather than dwelling on the bad. Be persistent and take the necessary actions to reach your objectives, because success does not happen overnight.

Next, “well-being” is a component that significantly affects how well children study. Students should therefore concentrate on their own moral principles because doing so would help them love themselves more and achieve more success in life. Consider the positive aspects of life while studying. Find ways to be grateful for your triumphs, your favorite items, and your positive experiences. You can maintain a healthy body and mind by exercising frequently, eating well, getting adequate sleep, and minimizing stress. These actions will make you feel happier. Additionally, search for chances to educate and better oneself. Your confidence and happiness might rise as a result of learning new skills, reading a good book, attending courses, volunteering, or engaging in community activities.

“Sociability” is the third component that has an impact on pupils’ learning outcomes. Students should therefore learn to respect others and listen to them. Additionally, if you want to learn more effectively, you need to live a more active life. Students must practice cultivating a positive outlook on life, being more sociable, being perfectionists, expressing their views to others, making friends on their own, and fostering stronger bonds with others. Students should aim to open their hearts and actively communicate with individuals around them, actively disclose their learning challenges to seek helpful guidance, and actively express their desires rather than being self-deprecating. Students should push over their boundaries, overcome themselves, gain greater confidence, dare to speak up and express their opinions, express their opinions when they participate in group activities, and be confident. promote your interests. Many students often surround themselves with a small group of people; they are always private, hesitant to communicate, afraid to express their own opinions, and afraid to stand up for their interests.

Finally, “sympathy” influences how well pupils learn. Students must maintain their composure in the face of any challenges and refrain from overthinking to improve learning efficiency. Students need to participate more in extracurricular activities that will boost their self-esteem and prepare them to express their feelings to friends and other people, consequently lowering stress levels and fostering a sense of community that will help them learn how to encourage themselves. Next, develop your listening skills by concentrating on others while they speak and by probing further into their feelings. Instead of focusing on your own sentiments, learn to feel better about others by concentrating on theirs. Be at ease and naturally converse with others. Additionally, to improve communication and emotionality, pay attention to your feelings, discover what makes you happy, and engage in social events, volunteer work, and other community activities. You can make new friends through these events and learn more about the struggles and obstacles other people face.

## **5. THE IMPLICATIONS AND CONCLUSION**

After the research, the research report met the topic’s research goals, which were to identify the elements of emotional intelligence that could influence and impact students’ academic results at some universities in Hanoi.

The study’s findings have led to the creation of the following specific contents: Briefly describe the theoretical underpinnings of emotional intelligence and how it affects students’ learning activities based on local and international studies and references. Building an integrated research model from the examined

models to identify the characteristics that affect how well students at some Hanoi-area colleges study by incorporating existing emotional intelligence research models

To ascertain the influencing aspects of emotional intelligence on student learning outcomes, conduct surveys and experiments to test them via scales. As a result, the dependent variable (academic results) is positively impacted by each of the four independent variables (sympathy, self-control, sociability, and well-being). We suggest a variety of solutions based on the findings of the research report to assist students in changing their perception of emotional intelligence, creating a study plan, practicing and developing their emotional thinking capacity, and using it in real life. Along with making suggestions on how the school could better assist students in their studies.

Every topic for a scientific inquiry has advantages and disadvantages. As a result, the group's topic has the following restrictions: One is the subject of performing broad research for all students in the city of Hanoi rather than concentrating on a particular group of students. As a result, no one answer is appropriate for each group of students with various majors. Therefore, it is essential to establish distinct study subjects for groups of students with comparable majors to address deeper issues. Second, due to time and space constraints, the study was only able to conduct research in a few different locations, primarily a student-sized university in Hanoi city. This resulted in a lack of diversity in the research samples in terms of majors, academic years, and regions, and the obtained results were not favorable in terms of demographic factors. Third, the study was unable to contact specialists or individuals with psychology-related knowledge; therefore, it was unable to get the information needed to develop the questionnaire's contents and organize the scales.

The fourth involves locating papers. The study team encounters a time-consuming and challenging phase during which they frequently search for papers in an ambiguous manner, discover an excessive number of documents (even unrelated ones), and are unable to locate the required documents. On the other hand, there are still few real records and foreign documents available on the subject. To be able to provide the most beneficial solutions to improve the quality of study for each student across the nation, we will study more about other study levels, broaden the research area, and conduct more extensive research on each particular specialized group in the subsequent study period.

## APPENDIX

### THE SURVEY

*(Used to collect opinions from students of universities in Hanoi city)*

For the goal of examining the influencing elements of emotional intelligence on the learning outcomes of students at some universities in the region of Hanoi City, it is necessary to create a foundation upon which to assess and enhance students' learning efficiency. We will gain a better understanding of the effect of emotional intelligence on students' learning thanks to the insightful remarks in this poll. We reassure you that all of the material provided is solely for research. Please take your time reading and responding to the questions.

Sincerely thank!

#### **A. What is correct for you?**

1. What year are you a student?

First year

Second year

Third year

Final year

2. What is your gender?

Male

Female

3. Are you a major student?

Economics

Technology

Education

Language

Other

4. What school are you a student of?

Thuongmai university

Vietnam National University

Hanoi University of science and technology

FPT University

Other

Commenting factors affecting emotional intelligence on student results of students in some universities in Hanoi city (check X or bold in the selected circle). *1 = Totally disagree; 2 = Disagree; 3 = Relatively agree; 4 = Agree; 5 = Totally agree*

#### **B. ASSESSMENT OF THE EFFECT OF FACTORS ON STUDENT RESULTS OF STUDENTS IN SOME UNIVERSITIES IN HANOI CITY.**

	Sympathy	1	2	3	4	5
DC1	I don't care to see things from someone else's point of view.					
DC2	Overall, I'm a pretty highly motivated person.					
DC3	Overall, I find it very easy to know exactly how I feel.					
DC4	People close to me often say that I treat them well.					
DC5	I don't find it difficult to express my feelings to those close to me.					
DC6	I can put myself in other people's shoes and experience their emotions.					
DC7	I always keep myself motivated.					
DC8	I find it easy to create bonds with people, even those close to me.					

	Self-Control	1	2	3	4	5
KS1	I often feel like I can regulate my emotions.					
KS2	I don't tend to change my mind often.					
KS3	I often find it easy to adapt to circumstances.					
KS4	Overall, I can deal with stress.					
KS5	I can control my emotions when I want.					
KS6	I tend to get involved in things that I later wish I had done					
KS7	Overall, I can adapt to the new environment.					
KS8	Others see me as an optimist.					

	Sociability	1	2	3	4	5
HD1	I can flexibly interact with people.					
HD2	I often actively speak up to protect my rights.					
HD3	I often actively speak up to protect my rights.					
HD4	I find myself good at communicating.					

HD5	I tend to always move forward because I know I'm supported.					
HD6	I seem to have influence over other people's emotions.					

	Well-being	1	2	3	4	5
HP1	I often find life interesting.					
HP2	Overall, I'm comfortable with my point of view.					
HP3	Overall, I have an optimistic view of most things.					
HP4	Overall, I am satisfied with my life.					
HP5	I feel good about myself right now.					
HP6	I believe everything will go well in my life.					

	Academic results	1	2	3	4	5
KQ1	I have academic results that meet my goals.					
KQ2	I will have better academic results in the next semester than in the previous semester.					
KQ3	I believe I am an effective learner.					
KQ4	My friends rate me as an effective learner.					
KQ5	My teachers consider me to be an effective learner.					

Thank you very much for your cooperation!

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## THE IMPACT OF SANITARY AND PHYTOSANITARY MEASURES AND TECHNICAL BARRIERS TO TRADE ON VIETNAM'S TEA EXPORTS

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**ABSTRACT:** *The study uses a gravity model to estimate the impact of Sanitary and Phyto-Sanitary measures (SPS) and Technical Barriers to Trade (TBT) on Vietnam's tea exports. The results show that SPS measures have hindered Vietnam's tea exports. Each additional SPS measure would reduce Vietnam's tea exports by an average of 0.007%. Meanwhile, the regression analysis of the factor TBTs has a positive value, showing that this factor promotes Vietnam's tea exports. The study also proposes two groups of solutions to promote Vietnam's tea exports.*

**Keywords:** *SPS, TBT, tea, export, gravity model.*

### 1. INTRODUCTION

Tea is one of Vietnam's main export agricultural products. Vietnam's tea has been exported to more than 70 countries and territories with an average turnover of nearly 170 million USD/year. Tea export creates jobs and increases incomes for workers in many rural areas. However, Vietnam still mainly exports raw tea products, low added value, has not exploited the domestic advantages in production.

According to the United Nations Conference on Trade and Development-UNCTAD (2012), NTMs are non-tariff measures, but "can have an economic impact on the exchange of goods between countries". NTBs refer to restrictions due to specific bans, conditions or market requirements that make it difficult and/or expensive to import or export a product. NTBs also include the improper and/or inappropriate application of non-tariff measures (NTMs) such as sanitary and phytosanitary measures (SPS) and technical barriers to trade (TBT). In the WTO framework, NTMs are defined as "Non-tariff measures are measures that are not tariffs, but relate to or may affect the movement of goods between countries". Meanwhile, "non-tariff barriers are non-tariff measures that impede trade without a legal, scientific and fair basis". Therefore, NTBs are a subset of NTMs. Thus, in practical application and research overview, instrumental measures are understood as NTMs when the following basic points are ensured: Firstly, NTMs are types of measurement tools of the non-tariff trade policy, applied to imported goods (some applied to exports); Secondly, non-tariff instruments may or may not affect trade flows; Thirdly, not all measures affecting trade flows are implemented with discriminatory or protectionist purposes, such as trade barriers. NTMs can affect trade flows in terms of trade volume and impact benefits and costs from production to final consumption; Fourthly, NTMs are built on the basis of facilitating market access and regulating imports or providing appropriate protection for sensitive sectors within the framework of the World Trade Organization and regional commitments.

According to the WTO Agreement, SPS measures are laws, regulations, standards and procedures that governments use to protect human, animal or plant life or health from risks associated with them. Risks here refer to the spread of pests, diseases or disease carriers caused by organisms or from toxic additives or contaminants present in food, drink or feed. For example, SPS measures could be products and process-

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specific standards, requirements for products produced in disease-free areas, quarantine and inspection procedures, sampling and testing. In return, limiting pesticide and drug residues in food and banning some food additives.

+ Prohibit import restrictions for reasons of hygiene and quarantine. This is the country's regulations for products imported from countries and territories with epidemics in order to promptly prevent epidemics and diseases from entering the importing country.

+ Regulations on residues or limits of chemicals used. Many countries use regulations on the list of chemicals banned from use in cultivation, agricultural products processing or regulations on chemical residues, restricting chemicals used to ensure safety and health. of humans, animals, and plants.

+ Prohibit the importation of products from specific low-production areas (due to region-specific pest concerns) and importation of production inputs (e.g. nurseries, seeds).

+ Food additives, residues and contaminants (e.g. Maximum Residue Limits (MRLs) for pesticide residues; veterinary drug residue limits and hormone use in meat production).

+ Product regulations or processing specifications (e.g. Restrictions on the use of antibiotics, sulfur dioxide, sorbic acid, potassium sorbate, biotechnology and genetic material).

+ Regulations on microbiological contamination; Chemical contaminants; Irradiation and other forms of hygiene, including washing meat with antibacterial agents.

+ Regulations of agricultural biotechnology (eg. GM crops on animal cloning); Other perceived health risks. Various overlapping technology requirements such as labeling and standards, including Good Agricultural Practices (GAP) or land use practices, employ third-party auditors.

+ Hygienic requirements related to sanitary and phytosanitary conditions. These provisions are often reflected in national food safety legislation. For example, Japan applies the Law on Food Hygiene and Safety, according to which a shipment of food that does not meet food hygiene and safety standards will not be imported into this market.

+ Regulations on measures to treat and eliminate harmful organisms of plants, animals and disease-causing organisms in the final products. Pests, diseases of plants and animals, and carriers of diseases in food, drink or feed (e.g., blight, brown rot, rot, potato warts and fungi plants).

+ Regulations on hygiene and epidemiology during production, packaging, transportation, storage and distribution; regulations on packaging, packaging and labeling with sanitary and epidemiological information in order to prevent and control harmful effects and diseases to humans, animals and plants.

According to article 2, paragraph 1, of the SPS Agreement of the WTO, the purpose of using SPS measures is to prevent the entry of diseases and protect the health and life of people and animals and plants in the country. water. As follows (Annex A of the SPS Agreement):

Firstly, to protect the life or health of animals or plants in the territory of the Member from the threat of entry, appearance or spread of pests, diseases, pathogens or pathogens.

Secondly, to protect human or animal life or health in the Member's territory from danger from food additives, impurities, toxins or pathogens in food, beverages or beverages eat cattle.

Thirdly, to protect human life or health in the territory of the Member from the risk of diseases caused by animals, plants or products thereof or from the entry, appearance or spread of harmful species.

Fourthly, to prevent or limit other harm in the territory of the Member due to the entry, appearance or spread of pests.

Under the WTO agreement, TBT measures apply to both food and non-food items. TBT measures refer to product specifications, such as manufacturing standards, specifications, product environmental



regulations, and voluntary processes related to health, hygiene and safety biology and animal welfare, as well as testing procedures, product specifications, specifications, approvals and marketing. biotechnology.

+ Import quotas and controls (such as permits) and other administrative requirements (e.g., protocols, risk assessments, exemptions, permits, tolerances, packaging requirements). Those are the regulations for importing businesses and imported goods to comply with in order to be licensed to import.

+ Export restrictions and bans.

+ Food law, including quality standards, food safety, domestic content and blending requirements as well as rules of origin requirements.

+ Certification programs, including organic certification, marketing and eco-labelling requirements, such as health claims and country of origin.

+ Regulations on processes, production methods, methods of storage, transportation, regulations on product quality, regulations related to safety and performance, etc.

+ Regulations on packaging standards and labeling requirements. These are regulations related to packaging specifications, packaging materials, language and content of labeling information (product name, ingredients, instructions for use, expiry date, ...), symbols, necessary codes to guide the transportation and preservation of goods.

+ Ions regulate food and consumer safety (e.g., labeling, packaging, pesticide residue testing, nutritional content labeling, and contamination prevention). These regulations put limits on chemical residues, restricting the use of certain substances. This includes regulations on the maximum limits of chemicals used in the production process or regulations on the use of certain substances as ingredients or materials to avoid risks to users.

+ Measures to prevent consumer fraud (e.g. shipping and financial documents, identity and measurement standards).

The main objective of the TBT Agreement is to ensure that technical regulations, standards and conformity assessment procedures do not create unnecessary obstacles to international trade:

Firstly, to protect the safety and health of people, animals and plants. Countries often control commodities, volume, and quality of goods traded on their markets through NTMs such as import-export bans, import-export quotas, import-export permits, goods. technical barriers, sanitary and phytosanitary measures, regulations on origin of goods, ensuring that the goods purchased and sold do not cause harm, do not affect human health or cause harm, adversely affect the safety and life of plants and animals.

Secondly, to protect the domestic industry. Countries always want to protect domestic industries from competitive pressures of foreign enterprises. The use of non-tariff measures such as intellectual property protection, trade safeguards and subsidies. Trade-related investment measures will help domestic enterprises keep the market.

Thirdly, to protect the environment. Environmental protection is one of the important goals of every country. Manufacturing activities have a negative impact on the environment. Therefore, countries use necessary regulations to limit the negative impact of production and trading of goods on the environment by non-tariff measures such as banning import and export, licensing import and export. regulations on technical regulations, in order to protect the environment against harmful effects from production and business activities of enterprises.

Vietnam's participation in free trade agreements (FTAs) has helped remove barriers to Vietnam's agricultural exports in general and tea in particular. However, countries tend to use more non-tariff measures (NTMs) to control trade. Among non-tariff measures, SPS and TBT measures are the most commonly used. Therefore, besides the basic advantages of enjoying preferential tariffs, there are still many challenges for Vietnam's tea

exports. This study analyzes the current situation of Vietnam’s tea exports from 2001 to 2021 and uses a gravity model to analyze the impact of SPS and TBT measures on Vietnam’s tea exports. In addition, the study also offers a number of solutions to promote mulberry silk exports to 2025 and effectively until 2030.

For developing countries, it is important to assess the trade impact of SPS and TBT due to the significant technological and financial constraints and inadequate market access they face. This study will analyze the impact of SPS and TBT on Vietnam’s tea exports for the following reasons:

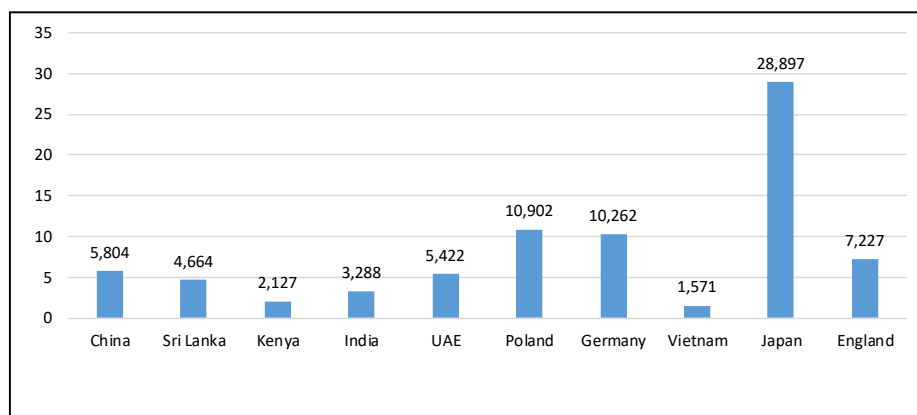
Firstly, NTMs are not always easy to identify and have only been sporadically collected for relatively few countries. The availability of information is a key challenge that also magnifies other challenges, such as the national streamlining of NTMs and regulatory cooperation at the regional and multilateral level to reduce any adverse effects of NTMs. Until recently, systematic information about NTMs was not available for a significant number of countries and a significant share of world trade (UNCTAD, the World Bank, 2018). Similarly, SPS and TBT measures have little relevant data. Therefore, our research was born to provide information on SPS and TBT for Vietnamese tea exporters.

Secondly, rising incomes will lead to the introduction of additional NTMs to satisfy consumer demands and to achieve the sustainable development goals. Higher-income countries use technical NTMs more extensively. The coverage of SPS measures in agriculture in developed countries is nearly 100 per cent. Furthermore, developed countries use three times as many TBT measures as developing countries (UNCTAD, the World Bank, 2018). Therefore, Vietnam needs to meet the standards, SPS, TBT set by developed countries to be able to penetrate these markets. However, Vietnam does not have a good quality management system (compliance with MRL regulations) and necessary certifications. That makes it difficult for Vietnam’s tea exports to access markets in developed countries around the world.

Thirdly, compared to the top 10 tea exporting countries in the world in 2020, the price of Vietnamese tea is the lowest, at 27,326 USD/ton compared to 28,897 USD for Japan, 4000 USD for China, and 3,093 USD for Sri Lanka, etc. In general, the price of Vietnamese tea has always been low for many years due to the impact of SPS and TBT which may be the cause of the decrease in the export price of Vietnam’s tea. Because the purpose of these measures is to protect human or animal or plant life. Meanwhile, Vietnamese tea products were tested for having pesticide content exceeding the prescribed standards.

**Figure 1: Price of 1 ton of tea exported by Vietnam compared to the top 10 tea exporting countries in the world**

*Unit: Thousand USD*



*(Source: Author's calculations based on TRADE MAP database)*

Our empirical objective is to estimate whether SPS and TBT imposed by importing countries have a significant impact on Vietnam’s exports of tea products. The remaining question is whether SPS and TBT have facilitated or hindered Vietnam’s tea exports.

We hope that this estimate will contribute to a better understanding of the impact of SPS and TBT on Vietnam's exports of tea products, which is crucial for Vietnam to design and implement policies to strengthen Export better efficiently.

The rest of this article is structured as follows. Part 2 presents the basic theory of the impact of SPS and TBT on exports and briefly summarizes the results of related studies. Part 3 outlines econometric models and data sources, and Part 4 describes empirical results and discusses them. The final section provides conclusions and policy implications.

## 2. LITERATURE REVIEW

Not all SPS and TBT measures have a negative impact on trade. A number of measures can help reduce trade costs by standardizing information regarding product safety, quality and specifications for business partners and information for consumers (UNCTAD, two thousand and thirteen). These measures also have an important function in facilitating international trade, including facilitating greater access to foreign markets for small and medium-sized enterprises (SMEs). TBT measures also enable governments to pursue legitimate goals such as protecting human health and the environment as well as preventing fraud.

However, non-transparent, discriminatory or baseless TBT and SPS measures are significant barriers to trade when they become barriers to agricultural products. This is contrary to the objective of trade liberalization of the Agreement on Agriculture.

+ Increasing export costs and reducing the competitiveness of exported goods. Exporting companies incur compliance costs to develop products that meet new standards and regulations or obtain the necessary certifications for production. These costs can increase export prices, thus underscoring the trade-restrictive effect (Maskus et al. 2000). In addition, indirect costs should be taken into account (e.g. the cost of changing the product structure to conform to the importing country's trademark regulations), the costs of inspection, testing, evaluation, purchasing buy equipment. equipment, costs due to lack of transparency, excessive delays and uncertainty about the conformity assessment process.

+ Limited access to the market of the importing country. Developed countries have monopolistic economic and technological advantages that, through legislation or other optional means, develop some harsh environmental standards and specifications, which limit significantly market access of exporters, especially in developing countries (Bossoma Doriane N'Doua, 2022). Technical barriers to trade will reduce the export output of exporting countries and their share in the world market (K. P. G. L. Sandaruwan et al., 2019). In the extreme, when importing countries set increasingly high standards, agricultural products produced at low technology level are forced to leave the market because they do not meet requirements and standards. In case, companies want to maintain their market share, they have to improve technology and increase investment. This will increase costs, increase costs and reduce international competitiveness.

+ Promoting technological innovation, improving production and business processes for production and export, through improving the competitiveness of export goods (S.A. Neeliah et al., 2012; Rossanto Dwi Handoyo et al., 2012; Rossanto Dwi Handoyo et al., 2012). partner, 2019; Joe Eyong Assoua et al., 2022). One aspect of this impact is that domestic exporters and manufacturers differ in their ability to cope with the new standards. Normally, the importing country will set common standards for goods imported into that country. As a result, not only does the country in question face additional costs to meet the SPS and TBT standards, but other partner countries need to meet these standards as well. In that context, businesses that cannot change to meet high environmental standards will lose their competitiveness and will eventually be eliminated by the market. Enterprises that have experience, often innovate and adapt well will survive

and have a more competitive advantage. Thus, this can be considered an opportunity for exporting countries when competing to export agricultural products to a specific market.

+ Reducing consumer demand in the importing country for imported agricultural products. It can be seen that the limited impact of consumption on exports is because the application of SPS or TBT measures can increase export prices for domestic consumption. import. Thus, as prices rise, the amount of foreign demand for the country’s exports decreases. Then, consumers will search for and switch to consuming domestic goods or goods imported from other countries at cheaper prices (Marina Murina et al., 2014; Jacob Wood et al., 2020).

+ From an impact perspective, SPS and TBT increase the importing country’s demand for imported agricultural products (Olayinka Idowu Kareem et al., 2017; Jacob Wood et al., 2020). On the other hand, they are implemented in the name of protecting human health, animals/plants and the environment. From a positive perspective, even measures that discriminate between imports and domestic products or increase the cost of imports beyond what is necessary can have a positive impact on the main objectives of a country. policies, such as mitigating safety risks and other market failures (Eyal Ronen, 2017; Hea-Jung et al., 2019). Therefore, SPS and TBT measures act as positive catalysts for exports by boosting consumer demand for imports.

### 3. RESEARCH METHODOLOGY

#### 3.1. Estimation model

We use the gravity model (GM) proposed by Jan Tinbergen (1962) and developed by Anderson and van Wincoop (2003) to estimate the impact of SPS and TBT measures on Vietnam’s tea exports. The model is in the logarithmic form as follows:

$$\ln(\exp_{it}) = \beta_0 + \beta_1 \ln(\text{tar}_{it}) + \beta_2 \ln(\text{SPS}_{it}) + \beta_3 \ln(\text{TBT}_{it}) + \beta_4 \ln(\text{impsh}_{it}) + \beta_5 \ln(\text{ireer}_{it}) + \beta_6 \ln(\text{gdp}_{it}) + \beta_7 \ln(\text{dist}_{it}) + \gamma_1 + \gamma_2 + \gamma_3 + \gamma_4 + \gamma_5 + \gamma_6 + \gamma_7 + \gamma_8 + \gamma_9 + \gamma_{10} + \gamma_{11} + \gamma_{12} + \gamma_{13} + \gamma_{14} + \gamma_{15} + \gamma_{16} + \gamma_{17} + \gamma_{18} + \gamma_{19} + \gamma_{20} + \mu_t \quad (1)$$

In which “ln” is the natural logarithm, “i” means the importing country, and “t” refers to the year;

+  $\exp_{it}$ , is a dependent variable, stands for the export value of tea products from Vietnam to 31 countries and territories at time t.

+  $\text{tar}_{it}$  is the average tariff of 31 countries and territories applied to the import of tea products. When tariffs are imposed on imported tea, the price of tea in the importing country increases. This could lead to a decrease in the demand for tea in that country.

+  $\text{SPS}_{it}$  and  $\text{TBT}_{it}$  are applied by 31 countries and territories to tea imported from Vietnam in year t. The impact of tariffs on exports is limited while the impact of SPS and TBT measures cannot be determined. If the importing country adds a SPS or TBT measures, the import requirements will be more stringent and adversely affect tea exports. However, it can also boost tea exports by building consumer confidence in the safety of the product.

+  $\text{impsh}_{it}$  is the share of 31 countries’ imports share in the world trade’s value of tea products in year t. This can be considered as a representative of the market power of the importing country for each specific item. When a new SPS and TBT measure is introduced, the market power of a large importing country may mean higher compliance costs for exporting countries and a larger negative impact on trade because they don’t have many other market options to export. However, assuming a country needs to import a lot of products, in that case it will be difficult for exporting countries to

redirect their products to other markets and lead to more efforts to comply with SPS and TBT. When an importing country has an increased share of imports of a certain commodity, it shows that the import demand of that country for that product in the market increases and will increase the exports of other countries to that commodity with this item.

+  $ireer_{it}$  represents the real effective exchange rate of 31 countries and territories in year  $t$ . We expect the sign of this coefficient to be positive because the stronger currency of the importing country when the exchange rate increases will help importing countries tend to consume more and Vietnam's tea products will be exported export more.

+  $gdp_{it}$  reflects the gross domestic product of 31 countries and territories in year  $t$ . GDP is calculated for the absorption capacity of 31 countries and territories on imported tea products. This factor is expected to have a positive impact on Vietnam's tea exports.

+  $dist_{it}$  is the distance of 31 countries and territories to Vietnam, determined based on the distance from the capital Hanoi to the capitals of 31 countries and territories. We consider the sign of this coefficient to be negative because the growing distance will make it more difficult to export goods. Due to the geographical distance between the two countries affects the freight rates, risks during transportation, etc.

We also add dummy variables from  $y1$  to  $y20$  to the model. These dummy variables are included in the model to increase the reliability of the estimate and control for possible deviations outside the model.

### 3.2. Data sources

Trade data is taken from the Commodity Trade Statistics Database (COMTRADE) and supplemented by the ITC database. This source provides data on the export value of countries to partners by year and by a group of goods detailed to the 6-digit HS code. In our study, we collected data on the export value of tea products with a 4-digit HS code. This source also provides the total value of import and export of goods of each country by year, allowing the author to calculate the share of Vietnam's exports.

Data on SPS and TBT measures for 31 countries and territories are obtained from the WTO website which provides data on SPS and TBT notifications through the Integrated Trade Portal (I-TIP). This data source provides 136 NTMs that WTO members provide for each commodity group (details for products with 6-digit HS codes). In addition, information on SPS and TBT is also published by the International Trade Center (ITC) on its website [macmap.org](http://macmap.org).

Tariff information is available in the Trade Analysis Information System (TRAINS) and WTO Integrated Database (IDB) databases through the World Integrated Trade Solutions (WITS) online platform. The choice of tariff rates included in the regression model is carried out on the basis of following the following rules: The preferential tax rate under the PTA will be considered for selection in advance. In case preferential tariff information is not available or does not apply, the most favored nation (MFN) tax rate will be replaced.

GDP data derived from Basic Data Selection — anaWebClient – United Nations Statistics Division 2015 Real GDP per capita PPP for 31 countries and territories were used in the model for estimation.

The true effective exchange rate ( $ireer$ ) is obtained from Bruegel's website:

<http://www.bruegel.org/publications/datasets/real-effective-exchange-rates-for-178-countries-a-new-database/>

Distance data was collected from Google Maps on the distance from Vietnam's capital Hanoi to the capitals of 31 countries and territories.

## 4. RESULTS AND DISCUSSION

### 4.1. Econometric results

The estimated coefficient for *ltar* is in line with expectations and is significant. This result shows that the higher the import tax imposed by the importing countries on Vietnamese tea products, the lower Vietnam's tea exports will be. Keeping other factors unchanged, with a 1% increase in customs duties, Vietnam's tea exports will decrease by about 0.258% on average. Importing countries' imposition of export tax on Vietnamese tea not only increases the export price of Vietnamese tea to these countries, but also reduces the relative competitive advantage between Vietnam's tea products and other countries (in the case of other countries) cases where these exporting countries are not subject to import duties) or they are subject to a lower import duty rate).

The regression coefficient of *ireer* shows sign of agreement with the expectation. When the value of currencies of importing countries increases, people of these countries will tend to consume more, so these countries will import more, leading to an increase in Vietnam's tea exports. Specifically, a 1% increase in the real effective exchange rate of importing countries will increase Vietnam's tea exports by an average of 0.260%. However, this result was not statistically significant.

The regression coefficient of *impish* has a positive sign and is statistically significant. According to measurement, the higher the import rate of importing countries in the world market, the more promoting Vietnam's tea exports to this country. When other factors are constant, if the import proportion of importing countries increases by 1%, the average export value of Vietnam to this market will increase by about 0.0539%.

The regression coefficient of *gdp* has a positive sign as expected. The higher market size and purchasing power in these countries will increase demand for Vietnamese tea products. If the average GDP of the importing country increases by 1%, Vietnam's average tea exports to this market increase by 0.0154%.

The regression coefficient of *dist* is negative. If the gap between Vietnam and importing countries increases by 1%, the average tea export of Vietnam to this market will increase by 0.0154 %.

Considering the impact of SPS and TBT measures, the results show that SPS measures have a limited impact on Vietnam's tea exports. On average, when an importing country announces additional SPS measure, Vietnam's tea exports will decrease by about 0.00667%. This result is similar to the research results of Nguyen Thi Thu Thuong (2018), Le Thi Viet Nga et al (2019), Nguyen Quoc Thai (2020), Amir Mustafa et al (2022), Sedigheh Alaebakhsh et al (2012), Jason H Grant et al (2015), Yuan Li et al (2011), Sushil Mohan (2021), Rossanto Dwi Handoyo et al (2019), K. P. G. L. Sandaruwan et al (2019), G. H. Udagedara et al (2022) show the negative impact of SPS measures on commodity exports. Meanwhile, the impact of TBT measures aimed at boosting Vietnam's tea exports. However, the level of impact may be small and not statistically significant. According to the calculation results, on average, when an importing country announces additional TBT measure, Vietnam's tea exports will increase by about 0.00950%. This result is also consistent with many previous studies on the impact of TBT measures on commodity exports such as the study by G. H. Udagedara et al (2022), S. M. H. Shah et al (2014), Rossanto Dwi Handoyo et al (2019).

**Table 1: Estimation Results of the importing countries' SPS and TBT applied to Vietnam's tea Export**

Variables	(1) Model3
<i>ltar</i>	-0.258***

	(0.0472)
sps	-0.00667***
	(0.00218)
tbt	0.00950
	(0.00856)
impsh	0.0539**
	(0.0254)
lreer	0.260
	(0.170)
lgdp	0.0154
	(0.0269)
ldist	-0.139***
	(0.0403)
	(0.0494)
Constant	2.132***
	(0.718)

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

(Source: Authors' estimation)

#### 4.2. Discussion

Overall, SPS measures have had a limited impact on Vietnam's tea exports. From that, it can be seen that the SPS measures that the importing country applies to imported tea products are a concern for Vietnamese tea exporters. Vietnam's exports are still raw, with low nutritional value. The investment and care of tea plants in tea areas are still low compared to requirements, especially in areas with slow economic development, the care of tea plants is even worse. In addition, a serious problem affecting compliance with SPS measures is that pesticide residues in tea leaves exceed permissible limit due to arbitrary use of pesticides, wrong dosage, not right type and wrong process. This leads to Vietnamese tea still producing an unhygienic amount of tea, affecting the reputation of Vietnam, causing anxiety to users, and making it difficult for Vietnam's exports.

Meanwhile, TBT measures have a positive impact on Vietnam's tea exports. The reason may be that Vietnamese tea exporters have focused on investing in labels, packaging and technical equipment to meet TBT's requirements.

The market power of the importing country has a positive impact on Vietnam's tea exports. The higher the proportion of tea imports by importing countries in the world market, the more promoting Vietnam's tea exports. This result shows that the greater the market power of the importing country in the international market, the more positive the impact on Vietnam's tea exports.

Tariffs have the effect of limiting Vietnam's tea exports. Therefore, Vietnam actively participates in FTAs, tariff barriers will be removed to zero, which will be a positive factor for Vietnam's exports in general and tea exports in particular.

The average GDP of importing countries has a positive impact on Vietnam's tea exports. Compared with other factors, the influence of GDP on exports is quite large. This result is also consistent with the theory when considering the impact of GDP on consumer income on import demand. In general, the average income of importing countries tended to increase during the study period, thereby increasing import demand.

Geographical distance in international trade has a negative impact on Vietnam's tea exports. The longer the distance between the importing country and Vietnam, the more transportation costs and other risks arise. In fact, domestic logistics costs account for a relatively high proportion of product costs, along with the scarcity of empty containers, which has pushed up international shipping rates and significantly affects competitiveness. of Vietnamese tea products.

## 5. POLICY CONCLUSIONS AND IMPLICATIONS

Firstly, tea exports still face obstacles from SPS measures applied by importing countries. In the coming time, Vietnam's tea industry needs to continue to find measures to meet the regulations on food safety, hygiene and epidemiology that are being applied by importing countries. The government needs to develop a set of national standards for tea exports in harmony with international standards. At the same time, planning the production of tea for export in the direction of clean production. The Government also needs to have policies to support training and capacity building for tea farmers, to practice sustainable tea production using pesticides under the Integrated Pest Management and Nutrition Program (IPM, ICM).

Enterprises need to have a research strategy to improve quality, innovate technology in production, processing, control the quality of input materials such as seeds, fertilizers, especially pesticides.

Secondly, Vietnam needs to better exploit the advantages of FTAs. At the same time, the Government needs to continue to take measures to support businesses to cut costs in production, processing and export. Accordingly, ministries, sectors and localities need to continue to reform institutions, simplify administrative procedures, cut costs, remove obstacles and barriers for export in general and tea export in particular.

From the perspective of export enterprises, it is necessary to continue to improve production efficiency. Exporting enterprises promote the form of joint ventures, association with domestic tea exporters or joint ventures with foreign enterprises to have strengths in technical factors, technology, input materials, etc.

Thirdly, the average GDP has a positive impact on tea exports. Therefore, boosting exports to target market segments with high living standards will make an important contribution to maintaining and improving Vietnam's tea export turnover. In order to promote tea exports to these markets, the Government needs to strengthen trade promotion measures, provide market information as well as organize connection, trade, and gender promotion programs, etc to introduce and promote Vietnamese tea to foreign partners.

Fourthly, geographical distance in international trade has a relatively large impact on Vietnam's tea exports. In fact, domestic logistics costs account for too high a proportion of product costs, along with the scarcity of empty containers, which has pushed up international shipping rates and significantly affected the competitiveness of Vietnamese goods. Therefore, cutting transportation costs is one of the important measures to boost tea exports. To reduce logistics costs, a total solution is needed; which focuses on continuing to invest and develop logistics infrastructure.

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## DETEMINANTS OF JOB SEARCH AND JOB SELECTION IN ECONOMICS STUDENTS OF GENERATION Z IN HANOI

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*ABSTRACT: Gen Z, who were born between 1997 and 2012, is gradually becoming the primary workforce in the global economy, with Gen Z students playing an increasingly decisive role. Therefore, researching the factors that affect their behavior in the labor market, such as job search and job selection, is crucial. The research has developed a system of indicators that serves as a scale to measure the impact of these factors on the decision-making process of economics students regarding job research and selection. This scale system is derived from previous studies, with some observed variables adjusted to align with the perspectives of economics students in the recruitment environment of our country, specifically in the city of Hanoi. The findings indicate that social influence, including family, friends, and school; suitable working conditions based on personal circumstances (such as income, training and promotion opportunities, and suitable working conditions for individuals); and the reputation of employers' brands are factors that significantly influence students' decisions.*

*Keywords: job seeking, job selection, Gen Z*

### 1. INTRODUCTION

With increasing global competition, human resources can play a crucial role in establishing a business's competitiveness, particularly during challenging times such as the current state of the global economy, marked by recessions and rapid technological and communication changes. In this context, Gen Z, a group of people born between 1997 and 2012, is gradually emerging as the main workforce of the global economy. With their technological prowess and inclination towards change, this generation's curiosity becomes a driving force in shaping and creating new values for future society. Globally, Generation Z includes about 2.6 billion people worldwide, or about a quarter of the global population. In Vietnam, Gen Z accounts for about 25% of the country's workforce, or about 15 million people.

There are many acknowledged differences in the behavior of Gen Z compared to previous generations. Therefore, it is important to conduct in-depth studies on their working perceptions and behaviors to better understand how they navigate the labor market. Currently, a huge problem for businesses and researchers is to understand how today's young people choose where to work to attract and retain talent (Csiszárík-Kocsír & Garia-Fodor, 2018). Students, who form the most important segment of the Gen Z workforce, receive special attention from businesses, employers and universities. The research question here is what determining factors influence these students' decision to seek and choose a job. Hence, we conducted research specifically focusing on analyzing the factors that influence job search and selection among economics students in Hanoi. The study aims to contribute to our knowledge and understanding of the behavior of this workforce, thereby enabling businesses to gain insights into their potential workforce and universities to better align their activities with the training needs of student human resources.

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## 2. LITERATURE REVIEW

Nguyen Thi Kim Phuong (2011) conducted a study titled “The influence of organizational image on the candidate’s intention to pursue a job in the recruitment process,” which identified several factors related to job selection. These factors include: (a) the opportunity to fully utilize one’s abilities in performing job duties, (b) opportunities for skill development and learning new work skills, (c) opportunities for career advancement, (d) maintenance of interest in the job, and (e) interesting job content. The study concluded that interesting jobs have the strongest impact on a candidate’s intention to pursue a job.

Tran Van Man and Tran Kim Dung (2010) focused on factors influencing workplace choices among graduates in their study “Factors affecting the decision to choose a workplace of graduates.” They identified eight factors: employment prospects, availability of open information and procedures, affection for the homeland, preferential policies, location and working environment, people, recreational conditions, and low cost of living.

Regarding job selection, Tran Thi Dieu Huyen (2014) conducted a study aimed at orienting students’ career choices after graduation and identifying factors affecting their career orientation. The study found that the most influential factors in candidates’ choice of employer include: (i) good career development opportunities offered by the company, (ii) opportunities to work in desired positions, (iii) personal suitability for job responsibilities at the company, (iv) appropriate scale of the company’s operations, (v) alignment of job tasks with interests and passions, and (vi) training opportunities.

In a research survey conducted by Heilmann, Saarenketo, and Liikkanen (2013), they emphasized the key factors for an employer branding strategy. These factors include a better employer name and image, improved job satisfaction, better satisfaction at work, active recruitment, and improved work motivation.

Jiří BEJTKOVSKI (2018) from Tomas Bata University in Zlín, Czech Republic, conducted a study titled “Factors affecting job search and choice employment of Generation Y students in the Czech Republic in employer branding context.” The study identified five factors that influence job search and choice in the context of employer branding: job security, income, workplace relationships, working environment, and opportunities for growth and advancement. Candidates frequently investigate information about job positions and working conditions when researching potential employers, along with company ratings and internship programs.

In Vietnam, Pham Ngoc Anh Thu and Tran Nguyen Van Khanh (2021) conducted a study on the perception and job-seeking behavior of Gen Z titled “Recruitment brand in recruiting Generation Z- Research on the perception and job-seeking behavior of Gen Z in Vietnam.” The study emphasizes that the recruitment brand is considered an important factor for Gen Z in their job search.

In the study “Talent Acquisition for Small Medium Enterprise (SME): A qualitative analysis of Generation Zers in Taiwan and Vietnam” by Cao Huynh Hong Phan (2022), it was found that Gen Z places importance on the image and brand of an organization during the initial stages of the recruitment process. Job advertisements that clearly define job duties and industry play a significant role. New graduates expect job advertisements to highlight development and training opportunities, as well as offer flexibility in the work environment, allowing them to create and learn at their own pace.

Base on the reviewed studies, it can be seen that, although Gen Z has received a lot of attention, in Vietnam, research on the behavior of Gen Z students has not been comprehensively studied. There have not been studies focusing on analyzing what factors affect the decision to choose and look for a job, which is almost not paid enough attention. Some studies have mentioned the influencing factors but only stopped

at the brand of the employer, there are many other aspects that have not been mentioned. This is a research gap that needs to be addressed soon.

### **Theoretical framework**

Based on the previous studies reviewed, the behavior of students in job selection and search can be understood and developed based on the following theories:

#### *Theory of Rational Action:*

The Theory of Reasoned Action (TRA), developed by Ajzen and Fishbein, emphasizes that the intention to perform a particular behavior is the most important factor in determining an individual's behavior. Behavioral intention is influenced by two main factors: the person's attitude towards the behavior and the subjective norm associated with the behavior. According to TRA, behavioral decisions are primarily influenced by attitudes and social influences.

#### *Theory of Planned Behavior:*

The Theory of Planned Behavior (TPB), introduced by Ajzen in 1991, builds upon the TRA and addresses some limitations of the previous model. TPB expands on TRA by incorporating an additional component called Perceived Behavioral Control (PBC) alongside Attitude-Ab and Subjective Norm (SN). PBC refers to an individual's perception of the level of control they have over performing a behavior. The TPB has proven to be valuable and effective in various psychological studies related to human behavior by including cognitive control as a crucial element.

Both TRA and TPB are applicable to voluntary behaviors and are supported by rational intentions and thinking. They provide frameworks for understanding the factors influencing individuals' behavioral decisions, including attitudes, social influences, and perceived behavioral control. These theories can be applied to studying students' behavior in job selection and search, providing insights into their decision-making processes and the factors that drive their choices.

#### *Theory of Rational Choice*

Rational-choice theory, also known as the Theory of Rational Choice, emerged in the 18th and 19th centuries from various disciplines. During this period, some philosophers argued that human nature is inherently selfish, always seeking gratification, satisfaction, and avoiding suffering. For example, Karl Marx posited that workers ultimately receive the outcomes they initially envisioned when entering the working process.

From a sociological perspective, George C. Homans generalized the principles of rational-choice theory with an equation: " $C = (P \times V) = \text{Maximum}$ ." In this equation, "C" represents the chosen action, "P" denotes the highest probability of success for that action, and "V" represents the maximum value or reward that the action brings. The optimal action is determined by multiplying the highest probability (P) by the maximum value (V).

Homans' Theory of Rational Choice emphasizes that individuals make decisions based on a rational assessment of the probabilities of success and the anticipated rewards. This theory assumes that individuals aim to maximize their gains and minimize their losses when making choices. In the context of job selection and search, individuals may consider factors such as the likelihood of success in a particular job and the potential rewards, such as salary, career advancement opportunities, or job satisfaction.

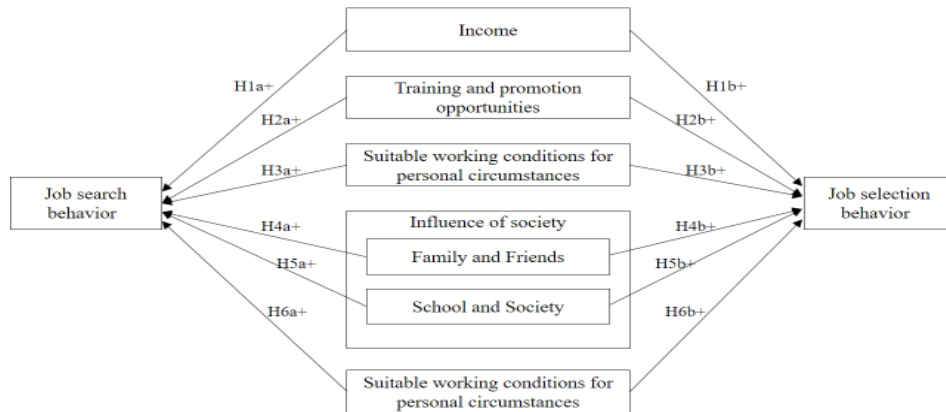
Rational-choice theory provides a framework for understanding decision-making processes based on the perceived probabilities of success and the value individuals attach to different outcomes. It can be

applied to the study of students’ behavior in job selection and search, shedding light on their rational assessments and motivations behind their choices.

**Research model and hypotheses**

Based on theoretical foundations, the research model explaining the relationship between influencing factors and the behavior of job selection and search; and hypothesis system are constructed as follows:

**Figure 1: Research model**



Research hypotheses:

*Hypothesis H1*

H1a: Income affects the job search of students majoring in economics, administration, and management in Hanoi city.

H1b: Income affects the job choice of students majoring in economics, administration, and management in Hanoi city.

*Hypothesis H2*

H2a: Training and promotion opportunities affect the job search of students majoring in economics, administration, and management in Hanoi city.

H2b: Training and promotion opportunities affect the job choice of students majoring in economics, administration, and management in Hanoi city.

*Hypothesis H3*

H3a: Suitable working conditions for personal circumstances affect the job search of students majoring in economics, administration, and management in Hanoi city.

H3b: Suitable working conditions for personal circumstances affect the job choice of students majoring in economics, administration, and management in Hanoi city.

*Hypothesis H4*

H4a: Family and friends affect the job search of students majoring in economics, administration, and management in Hanoi city.

H4b: Family and friends affect the job choice of students majoring in economics, administration, and management in Hanoi city.

*Hypothesis H5*

H5a: School and societal factors affect the job search of students majoring in economics, administration, and management in Hanoi city.

H5b: School and societal factors affect the job choice of students majoring in economics, administration, and management in Hanoi city.

#### *Hypothesis H6*

H6a: Reputation and employer brand influence the job search of students majoring in economics, administration, and management in Hanoi city.

H6b: Reputation and employer brand influence the job choice of students majoring in economics, administration, and management in Hanoi city.

#### **Research method**

A scale system is developed to measure the factors representing the influencing factors and behavior of Generation Z economics students. To accomplish this, a pilot research is conducted with the following steps: (i) Referring to previous studies and conducting face-to-face interviews with experts to explore factors and construct questionnaires; (ii) Conducting a pilot survey with a sample size of  $n = 76$  to refine the scale, eliminate inappropriate observed variables, and develop the final survey questionnaire. Then a official investigation is then conducted with a sample size of  $n = 212$  to test the research hypotheses and evaluate the influence of independent variables on the dependent variable.

The collected data is processed and analyzed, including screening observed variables, determining scale components and values, assessing scale reliability, and testing the theoretical model. The analysis utilizes SPSS and AMOS software, involving descriptive statistical analysis, Cronbach's alpha analysis to assess scale reliability and eliminate inappropriate variables. Exploratory Factor Analysis (EFA) is conducted to extract factors, and based on the EFA results, inappropriate variables are removed, the reliability of the new factor group is tested, and a re-run of EFA is performed to check the rotation matrix and extract new factors. Once new factors are obtained, they are included in the Confirmatory Factor Analysis (CFA) to validate the factor structure. Finally, a linear structural model analysis is conducted, transforming the CFA results into a Structural Equation Model (SEM) to examine the multidimensional structure among variables, determine the level of impact of each factor on the two dependent variables, and provide explanations for each influencing factor.

#### **Empirical results**

##### Scale test results

The research consists of 2 dependent variables: Job search behavior (TK) and Job selection behavior (LC), and 3 independent variables after adjusting the model: Job conditions suitable for personal conditions (DKCV), Social influence (AHXH), and Reputation, employer brand (NTD). All variables meet the conditions for analyzing scale reliability using Cronbach's Alpha coefficient (Cronbach's Alpha  $> 0.6$ ) and total correlation  $> 0.3$ , as suggested by Nunnally (1994).

The results of the Exploratory Factor Analysis (EFA) for both the independent and dependent variables show that the Kaiser-Meyer-Olkin (KMO) measure is greater than 0.5, and Bartlett's test is significant (Sig. =  $0.000 < 0.05$ ), indicating that the data used for factor analysis is appropriate and there are correlations among the variables. The extracted variance is  $62.529\% > 50\%$ , with Eigenvalue = 1.104, indicating that the EFA model is suitable. The factor loadings of all measured variables are greater than 0.5 (ranging from 0.571 to 0.929), demonstrating practical significance according to Hair et al. (2009).

**Table 1: Evaluation results of model scale with Job search behavior**

	Scale	Reliability		Convergent Validity		Discriminant Validity
		Cronbach's Alpha	Composite Reliability	Standardized Factor Loading	AVE	HTMT
		> 0.6	> 0.7	> 0.5	> 0.5	< 0.9
Working conditions	Income	0.911	0.911		0.596	Yes
	TN1			0.789		
	TN2			0.811		
	TN3			0.929		
	Working conditions					
	CN1			0.767		
	CN4			0.777		
	Training and promotion opportunities					
	DT3			0.666		
DT4	0.655					
Social influence	Friends and family	0.842	0.844		0.524	Yes
	GB2			0.623		
	GB3			0.587		
	School, society					
	XH1			0.722		
	XH2			0.785		
	XH3			0.834		
Reputation and employer brand	NTD1	0.874	0.842	0.761	0.572	
	NTD2			0.818		
	NTD3			0.798		
	NTD4			0.805		
	NTD5			0.750		
Job search behavior	TK1	0.941	0.940	0.737	0.636	Yes
	TK2			0.771		
	TK3			0.769		
	TK4			0.871		
	TK5			0.876		
	TK6			0.761		
	TK7			0.753		
	TK8			0.822		
	TK9			0.82		

**Table 2: Evaluation results of model scale with Job search behavior**

	Scale	Reliability		Convergent Validity		Discriminant Validity
		Cronbach's Alpha	Composite Reliability	Standardized Factor Loading	AVE	HTMT
		> 0.6	> 0.7	> 0.5	> 0.5	< 0.9



Working conditions	Income	0.911	0.906		0.582	Yes
	TN1			0.813		
	TN2			0.771		
	TN3			0.871		
	Working conditions					
	CN1			0.784		
	CN4			0.745		
	Training and promotion opportunities					
	DT3			0.678		
	DT4			0.655		
Social influence	Friends and family	0.842	0.844		0.523	Yes
	GB2			0.678		
	GB3			0.571		
	School, society					
	XH1			0.739		
	XH2			0.785		
	XH3			0.820		
Reputation and employer brand	NTD1	0.874	0.886	0.718	0.609	Yes
	NTD2			0.822		
	NTD3			0.807		
	NTD4			0.793		
	NTD5			0.758		
Job choice behavior	LC1	0.846	0.842	0.591	0.572	Yes
	LC2			0.751		
	LC3			0.795		
	LC4			0.776		
	LC5			0.699		

The CFA confirmatory analysis of the scales showed that the model indicators fit well, specifically: With the dependent variable model Job search behavior has:  $\chi^2/df = 2.277 < 3$ , CFI index = 0.910, GFI = 0.810, TLI = 0.894 all  $> 0.8$ ; RMSEA = 0.08 (Hair et al., 2009). Therefore, this model responds well to the collected data. The normalized loading coefficients of the observed variables are all greater than 0.5 (ranging from 0.587 to 0.929).

The composite reliability (CR) ranges from 0.842 to 0.940, all  $> 0.70$ , so the scales are reliable (Hair et al., 2009). The mean extracted variance (AVE) ranges from 0.524 to 0.636, all  $> 0.50$  (Bagozzi, Yi, & Phillips, 1991; Fornell & Larcker, 1981; Hair et al., 2009), ensuring the convergence condition. strong. The analysis results show that the correlation coefficient between each pair of concepts is  $< 0.9$ , significant with P-value  $< 0.05$ . Therefore, the discriminant validity of these concepts is reached (Steenkamp & Van Trijp, 1991).

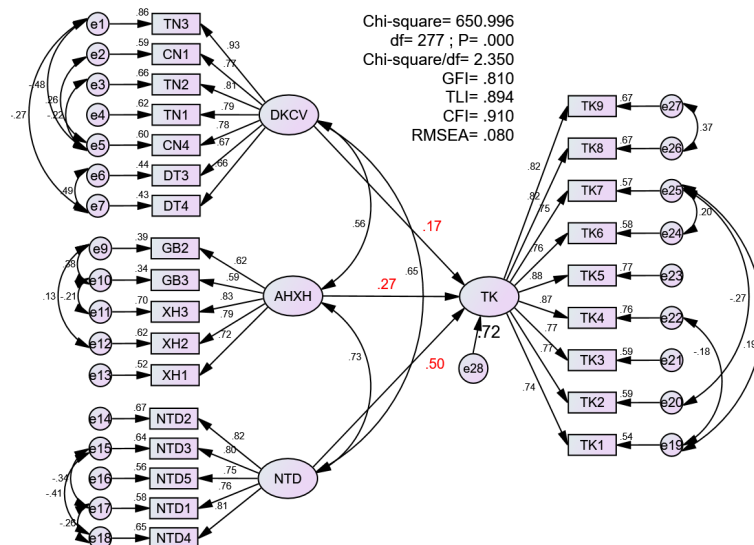
The results are similar to the dependent variable model. Job selection behavior is appropriate and satisfactory. Reliability indices like  $\text{Chi-square}/df = 2.352 (< 3)$ ,  $\text{CFI} = 0.913$ ,  $\text{GFI} = 0.836$ ,  $\text{TLI} = 0.896$  all  $> 0.8$ ;  $\text{RMSEA} = 0.08$ . The normalized loading coefficients of all observed variables are  $> 0.5$  (ranging from 0.571 to 0.871). All scales are reliable with composite reliability (CR) ranging from 0.842 to 0.906, all  $> 0.70$ , so the scales are all reliable. The average extracted variance (AVE) ranges from 0.523 to 0.609, all  $> 0.50$ , ensuring strong convergence conditions. The analysis results show that the correlation coefficient between each pair of concepts is  $< 0.9$ , significant with  $P\text{-value} < 0.05$ . Therefore, the discriminant validity of these concepts is reached.

The above results show that the model and construction scale are completely consistent with the data file, reliable enough to conduct a linear structural model test.

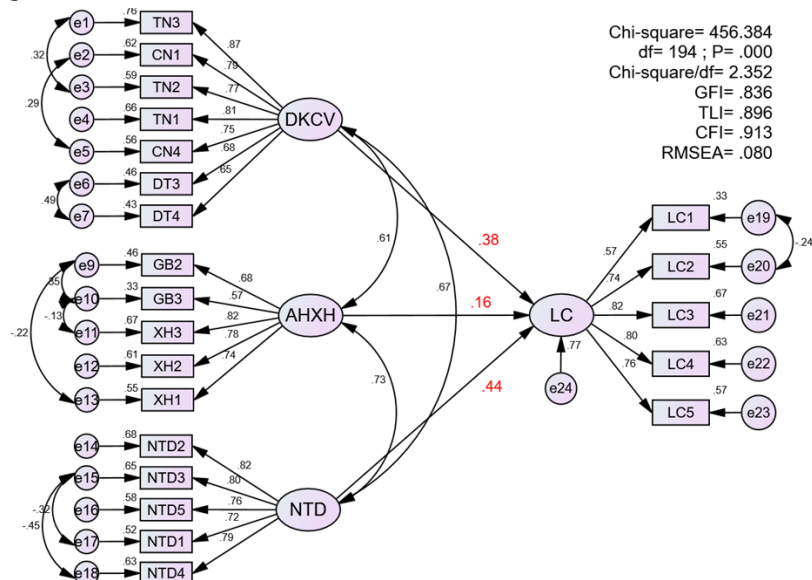
**Research finding and discuss**

The measurement model test was conducted to evaluate the linear structural model using Structural Equation Modeling (SEM) for the two dependent variables, as illustrated in Figure 2 and Figure 3. The fit indicators of the model demonstrate satisfactory results, indicating that the model is suitable for the survey data.

**Figure 2: SEM results of research model of Job seeking behavior (normalized)**



**Figure 3: SEM results of research model of Job selection behavior (normalized)**



The results indicate that all three independent variables have a positive impact on both Job seeking behavior and Job selection behavior, as evidenced by their respective normalized regression coefficients. Consequently, all six hypotheses of the new model are accepted.

The revised model includes six factors that influence the job search and job choice of economics students in Hanoi, namely Income, Training and promotion opportunities, Working conditions suitable to personal conditions, Influence of family and friends, Influence of school and society, and Reputation and recruitment brand. The findings reveal that three factors have a significant positive influence:

**Working conditions suitable for personal conditions:** This factor encompasses motivations related to income, opportunities for training and skill development, and favorable working conditions. The surveyed students express a desire to earn more money to fulfill their living needs and achieve financial independence, reflecting their independent attitude. They also prioritize training opportunities to enhance their professional knowledge and skills, recognizing that academic knowledge alone is insufficient for career success and advancement. Moreover, the convenience and flexibility of work arrangements, such as flexible working hours and the ability to work remotely, are important considerations for Gen Z students in their job search and selection process.

**Social influence:** This factor includes the influence of family, friends, school, and society on the job-seeking behavior and job selection of students. The results indicate that social influence plays a significant role in both job search behavior and job selection behavior. Students are influenced by the opinions and advice of their family, friends, and the broader social environment when making decisions about job opportunities. This underscores the importance of social networks and support systems in shaping students' career choices.

**Reputation and employer brand:** The reputation of a company or employer brand also influences students' job search and selection behavior. Students consider the reputation and brand image of a potential employer as factors of significance when deciding on job opportunities. A positive reputation and strong employer brand can attract and appeal to Gen Z students.

Regarding the specific impact of the factors on job-seeking behavior and job selection behavior, there is a notable difference. For job-seeking behavior, the factor "Social influence" has a relatively higher impact (normalized regression coefficient = 0.173) compared to the factor "Working conditions suitable for personal conditions" (0.272). Conversely, for job selection behavior, the impact of "Working conditions suitable for personal conditions" is stronger (0.377) compared to "Social influence" (0.183).

It is worth mentioning that the evolving work landscape, accelerated by the Covid pandemic and technological advancements, has led to changing attitudes and preferences among Gen Z students. They value flexibility in terms of working time and location, and they seek a balance between their academic commitments and work responsibilities. The ability to work remotely and have control over their time is highly desirable to this generation. Additionally, some comments suggest that Gen Z individuals may have a preference for independent work rather than traditional office settings and fixed working hours, which may impact their job choices and behaviors.

Overall, the results indicate that the revised model aligns well with the collected data, providing reliable insights to understand and explain the job search and job selection behavior of economics students.

However, it is worth noting that other factors such as the working environment and relationships with colleagues and leaders were not considered in the research model regarding their impact on the job search and job selection behavior of economics students. In reality, there are various opinions and discussions,

including some prejudices, about Gen Z's behavior in the workplace from other generations, colleagues, and employers, as well as from Gen Z individuals themselves. These issues involve conflicts in working styles, relationships, and communication between Gen Z employees and their superiors, colleagues, and future generations. Many opinions suggest that young people may be more prone to quitting their jobs immediately in case of disputes, disagreements, high ego, or when they feel that the generation gaps hinder their progress. Therefore, the relationship with colleagues, superiors, and the overall working culture can significantly impact a large portion of Gen Z employees. This factor might have been excluded from the research model due to non-standardized data collection. It is possible that the survey participants did not respond seriously or honestly. Moreover, as the survey sample primarily consisted of students, who may lack practical work experience, they might not fully appreciate the significance of this factor as individuals who have already entered the workforce.

On the other hand, the "Social influence" factor includes the influence of family, friends, and school on the job search and job selection behavior of students. Students believe that the university and its connections with businesses can benefit their job search and selection process. They often refer to job directories associated with their schools and seek advice from professors and instructors, expecting to find more opportunities through their academic networks. Gen Z students no longer perceive family relationships and external pressures (such as having a prestigious job) as significant factors affecting their decision-making. Generally, Gen Z students are more self-reliant and independent in their thoughts and considerations regarding their careers and job search behavior. However, the opinions and experiences shared by employees who have worked or are currently working in companies might not hold much influence on the behavior of Gen Z individuals. This might change if a wider research sample were employed, involving a larger number of surveys and subjects who are officially employed.

The "reputation and employer brand" factor has the most substantial impact on the job-seeking and job selection behavior of economics students, with standardized beta coefficients of 0.499 and 0.446, respectively. The reputation and brand image of an employer have been extensively studied, considering various aspects such as awareness, attitude, aspirations, and employment behavior among employees, including current and potential ones, especially among Gen Z individuals. Students tend to learn more about a business if they feel satisfied and interested in its products or services. Additionally, they aspire to work for large and renowned companies. Job postings and introductions from major companies always attract their attention and interest. They believe that such companies provide favorable working conditions, learning opportunities from experienced and specialized individuals, clear career pathways, and promotion prospects. Moreover, they assume that large and well-known companies offer higher salaries and attractive bonus schemes. Therefore, they trust and seek more information about renowned companies or groups. Moreover, information about various aspects of these large companies, including business operations, finance, administration, social activities, stock market performance, and employee experiences, is readily available on the internet. Furthermore, when it comes to human resources, Gen Z individuals tend to place higher trust and reliability in larger companies, making them more inclined to pursue job opportunities within such organizations.

For candidates in general, and specifically for candidates studying economics, the "prestige and brand of the organization" not only provides a guarantee of a recognized job and relative stability, but also instills a sense of pride in individuals. Naturally, no one wants to join a business with a poor reputation or no future prospects. Being an employee of a reputable organization also brings recognition from friends and acquaintances. Given that the majority of respondents in the sample had university and graduate

degrees, they are highly concerned about their personal brand. Consequently, the prestige and brand of an organization play a significant role in shaping their intentions and decisions. This aligns with the need for esteem, as outlined in Maslow's hierarchy of needs.

Furthermore, the research team discovered some differences between demographic groups in the job search and selection process, which have not been extensively discussed or deeply explored in previous studies. Graduates who have entered the labor market tend to have higher evaluation criteria compared to those who have no prior work experience. They may be more open to learning and working in fields unrelated to their academic training, but they scrutinize factors that align with their personal preferences more extensively. Consequently, the job search and selection behavior of these two groups of students differ in terms of frequency and the perceived importance of various factors. Similarly, the significance of job search and selection behavior in the career development process of economics students was found to vary among income groups.

## CONCLUSION

Through analysis, measurement, and research results have also demonstrated that the factors have a positive impact on job search behavior and job selection behavior of candidates. In particular, for job-seeking behavior, the survey results show that the job-seeking behavior of economics students is positively influenced by the following factors and the degree of decreasing from: Reputation, brand Employers to Social Influence and then to Working Conditions. For job selection behavior, the level of positive influence of the factor Reputation, employer brand is still the largest, followed by Working conditions, then Social influence. This is completely consistent with the reality and trend of choosing the current workplace.

Another goal achieved after surveying the research sample is that the group has learned some trends, actual job-seeking needs and behavioral characteristics while searching and choosing jobs of students. Economists are different from previous generations. As follows:

Finding 1: Gen Z students prefer flexibility in the post-pandemic work environment. They questioned whether the company allowed teleworking and how remote work works in the workplace. For them, the future of work is flexibility. More than three years of Covid-19 familiarize them with learning and working remotely. That's why they want to know if the job offers flexible and remote working.

Finding 2: Unlike the old generation, Gen Z students have a higher independent attitude than previous generations, they do not want to depend on their family and have a high self-esteem.

Finding 3: Students now no longer think that family relationships and work are too important to their job search and decision. Gen Z students are now more independent and independent in their thought, thinking about career and job search and choice behavior.

Research using convenience samples should limit the ability to generalize. The sample size was small and the scope of the study was narrow. If the survey is conducted over a wider area, the generality and reliability of the research results will be higher. The study only considers students studying economics, administration and management in general, but has not gone into specific industry groups, so the influencing factors found are still general and not representative when considering. Specifically in a branch, majoring in the economic sector. In order to confirm the difference in influencing factors as well as the degree of influence of these factors on job search and choice between candidates who have studied or are studying economics with candidates who do not Studying economics majors, research can continue to develop in the direction of studying the factors affecting job search and choice of non-economics students. From there, compare the two research results to confirm the difference (if any) between the candidates studying the

economics major and the remaining group of candidates and find a separate research model for the target group. Economics.

Therefore, the future research direction can be to expand the scope of the survey more broadly, to include more target groups, or to localize subjects belonging to a specific discipline in the economic sector, or to take a closer look. More than the impact of factors affecting students' search and choice between two groups of people studying economics and non-economics students.

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## EXAMINING THE IMPACT OF PEER PRESSURE ON CAREER CHOICE INTENTION AMONG HUMAN RESOURCE MANAGEMENT STUDENTS IN VIETNAM: THE MEDIATING ROLE OF ACADEMIC SATISFACTION

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*ABSTRACT: This study investigates the influence of peer pressure on the academic satisfaction and career choice intention of Vietnamese students specializing in human resource management. The study employs a quantitative research approach with a sample size of 258 participants. Descriptive statistics analysis, scale testing, exploratory factor analysis (EFA), and mediation model testing were conducted using SPSS 22 and Jamovi 2.3.21. The findings indicate that peer pressure positively affects both academic satisfaction and career choice intention among students studying human resource management. Furthermore, the results demonstrate that peer pressure significantly influences students' career choice intention through the mediating role of academic satisfaction. Based on these findings, the study provides practical implications for students, educational institutions, lecturers, and employers, offering guidance on managing peer pressure, enhancing career choice intention, and promoting academic satisfaction.*

**Keywords:** Academic satisfaction, career choice intention, human resource management, peer pressure

### 1. INTRODUCTION

Peer pressure among students is a prevalent and significant psychological issue that deserves heightened attention. In today's rapidly changing socio-economic landscape, students face various psychological pressures that have a substantial impact on their academic pursuits and future career choices. These pressures can arise from different sources and greatly affect students' emotions, thoughts, and behaviors.

In the context of the COVID-19 pandemic, the field of human resource management (HRM) has experienced profound transformations. The uncertain working environment has presented challenges for HR operations, with a reduced number of HR staff requiring remaining professionals to adapt and ensure optimal and flexible operations. Consequently, the demand for skills and knowledge in HR positions has increased, posing both opportunities and challenges for students in this field. Peer pressure can manifest during career orientation and job search while students are still in school, leading many to make career choices based on majority opinions or the advice of friends and family, rather than considering their own passions, capabilities, and quality. Therefore, it is crucial to investigate the influence of peer pressure on students' academic satisfaction and career choice intentions in the current circumstances.

While numerous studies have explored peer pressure within specific age groups and its correlation with academic satisfaction or career choice intentions, there has been limited focus on university students, particularly those majoring in management or HRM. Previous research has predominantly examined the negative consequences of peer pressure, such as substance use and alcoholism, with less attention given to the positive influence of this social phenomenon on the academic satisfaction and career choices of undergraduate students. Therefore, this study contributes novelty to the field by highlighting the positive effects of peer pressure in this context. The following research questions are proposed:

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<sup>1</sup> Thuongmai University

- How does peer pressure affect the academic satisfaction and career choice intentions of students majoring in HRM in Vietnam?
- Through the mediating role of academic satisfaction, how does peer pressure influence the intention to choose a career among students majoring in HRM in Vietnam?

## **2. THEORETICAL FRAMEWORK**

### **2.1. Peer pressure**

#### **2.1.1. The definition of peer pressure**

According to the American Psychological Association (APA), peer pressure occurs when an individual is influenced by others belonging to the same social group. This “group influence” can compel them to alter their attitudes, values, and behaviors to align with the standards and expectations of the group. Peer pressure often arises from feelings of inferiority or insecurity when individuals perceive that they lack or have not achieved the same things as their friends. Ryan (2000) defines peer pressure as the act of friends encouraging or urging someone to do something, regardless of their personal desires. However, Clasen and Brown (1985) argue that peer pressure involves the pressure to think or behave according to guidelines set by a peer group, which requires modifying one’s behavior to meet perceived expectations from others (Burns and Darling, 2002). Poonam and Rajesh (2017) explain peer pressure as the desire of individuals to engage in the same activities as others in their age group and social circle. This social group can exert direct or indirect pressure, often causing discomfort to those influenced.

To conclude, peer pressure is a condition in which an individual is psychologically influenced by people of the same age or a peer group in society, forcing them to change their attitudes, values, and behaviors to accordance with the group’s standards and expectations.

#### **2.1.2. Is peer pressure positive or negative?**

Clasen and Brown (1985) conducted a study with 689 students from grades 7 to 12, finding a strong correlation between peer pressure and five behavioral tendencies: conformity to peer norms, peer involvement, school involvement, family involvement, and misconduct. Similarly, Brown et al. (1986) proposed that adolescents’ perceptions of peer pressure are influenced by four domains: social involvement, conformity to peer norms, misconduct, and pro-adult behavior. The impact of peer pressure can be positive or negative, depending on the behaviors exhibited by peers. In this study, we anticipate that positive peer behaviors will have positive effects on students.

Social Learning Theory (Bandura, 1977) is closely related to peer pressure. Individuals tend to adopt behaviors they observe in trusted role models, particularly those with high status within the peer group. Bandura’s concept of self-efficacy is also relevant, as adolescents who believe socially learned behaviors are effective are more likely to adopt them.

Research conducted by McConchie et al. (2019) on positive peer pressure aligns closely with this theory. The authors define positive peer pressure as the beneficial impact of peer influence on the attitudes, beliefs, and behaviors of certain individuals, highlighting two main dimensions. First, positive peer pressure can enhance the quality of adolescents’ friendships and lead to positive experiences rather than increasing conflict and competition (Berndt and Keefe, 1995). This concept is evidently connected to social learning theory (Bandura, 1977). Second, individuals perceive and respond to peer pressure differently based on internal and external factors (Berndt, 1979; Krosnick and Judd, 1982; Steinberg and Monahan, 2007). For instance, peer compliance is higher among sixth and ninth graders (Berndt, 1979), as they are adjusting



to a new learning environment. In contrast, adolescents in grades 10 to 12 appear to be less susceptible to peer influence (Steinberg and Monahan, 2007). Therefore, the perception of peer pressure can yield varying outcomes among different age groups.

## 2.2. Management students

Research on management students has become increasingly diverse, exploring various aspects such as job readiness of management graduates (Brown and Scase, 1994; Cranmer, 2006; Griesel and Parker, 2009), the relationship between personality characteristics of students in this field and their employability after graduation (Potgieter and Coetzee, 2013; Potgieter, 2012), and the intention to start a business (Jena, 2020).

In addition to examining the connections between students and their careers or entrepreneurship, there is also significant attention given to the mental health of students in this major. Several studies have demonstrated that management students exhibit more negative attitudes towards mental health issues and are at a higher risk of depression compared to medical students (Vijayalakshmi et al., 2013; Dahlin et al., 2011). Research conducted by Lounsbury et al. (2009) identified key personality traits among this group of students, including lower levels of openness, agreeableness, and a high degree of extroversion. The authors explain that lower levels of openness correspond to shyness or shamelessness, low agreeableness is linked to reduced compassion, and high levels of extroversion are associated with a strong need for extrinsic motivation. Building upon the work of Lounsbury et al. (2009), Kotera et al. (2019) further investigated students in business and management majors and found that they tend to be highly concerned about their self-image, which increases their vulnerability to feelings of shame (Kotera et al., 2019).

## 2.3. Peer pressure and academic satisfaction

Understanding peer pressure within the university setting is crucial for enhancing productivity and designing effective learning systems. It is as important as teacher quality, available resources, and active learning methods in improving student outcomes and fostering motivation to learn (Choi and Yang, 2011; Gurpinar et al., 2010). Educational economists emphasize the relevance of peer groups in relation to student academic satisfaction, with peer pressure motivating students to strive for learning opportunities provided by the school (Hoxby, 2000; Akhtar, 2011). Peer relationships play a vital role in students' development, enhancing their competence and self-control, leading to positive long-term behavioral outcomes (Ryan, 2000; You, 2011).

Vietnamese studies have shown the positive influence of peer pressure on students' learning outcomes. Friends, who are easily accessible and of the same age, provide effective platforms for exchanging learning knowledge (Dang Thi Lan Huong, 2013; Vo Van Viet and Dang Thi Thu Phuong, 2017). Students perceive their friends as sources of learning motivation, leading to enhanced study skills, exploration of new ideas, and increased creativity, resulting in satisfaction when their learning expectations are met.

The argument that peer pressure has a positive effect on academic performance aligns with social learning theory (Bandura, 1977). Students tend to learn from and emulate outstanding individuals. When students have high expectations of their own abilities, they exert greater effort, which, when accompanied by positive results, leads to a sense of satisfaction in their learning journey. Therefore, the following research hypothesis is proposed:

**Hypothesis 1 (H1):** Peer pressure has a positive impact on the academic satisfaction of HRM students in Vietnam.

## 2.4. Peer pressure and students' career choice intention

According to Rani (2013), career decision making is an ongoing and dynamic process influenced by various factors such as self-knowledge, values, interests, characteristics, financial needs, and external

circumstances. The intention to choose a career is linked to the Theory of Planned Behavior (Ajzen, 1991), which suggests that individual behavior is driven by intention. Intentions are translated into actions only when they are within the individual's control and aligned with their will.

Research on the impact of peer pressure on career choice intentions among Asian students, particularly in Vietnam, is still relatively limited. In Vietnam, individual career choices are often influenced by parental desires, while societal expectations continue to shape the thoughts, lifestyles, and decisions of many individuals. Nguyen Thi Kim Nhung and Luong Thi Thanh Vinh (2018) found that among high school students in Nghe An, the influence of friends on career orientation was statistically insignificant, while the family factor emerged as a strong influencer of students' career intentions. Similarly, research conducted by Arif, Iqbal, and Khalil (2019) on factors affecting career choices of Pakistani students revealed that society and family exerted the most significant impact on students' career intentions.

On the other hand, studies by Naz et al. (2014), Ogutu et al. (2017), and Mtemeri (2017) suggest that friends do play a certain role in students' career decisions. Through interactions with friends, students gain valuable information about different career options. Additionally, Kaur (2020) found a significant relationship between peer pressure and career decision-making among adolescents, although the correlation coefficient for positive peer pressure was -0.14, while negative peer pressure exhibited a higher correlation coefficient of 0.25.

Therefore, it is evident that peer pressure always has an impact on students' career intentions. Based on this understanding, the following research hypothesis is proposed:

**Hypothesis 2 (H2):** Peer pressure has a positive influence on the intention to choose a career among students majoring in HRM in Vietnam.

## **2.5. Academic satisfaction and career choice intention**

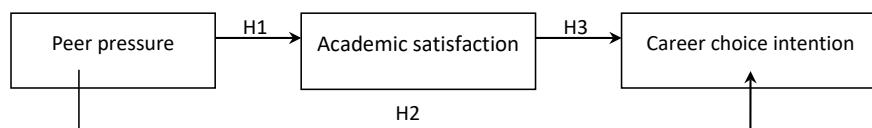
Academic satisfaction can be described as the contentment derived from accomplishing learning goals and aspirations (Kumar and Dileep, 2006). In essence, academic satisfaction is viewed as field-specific satisfaction, wherein students perceive the curriculum as a resource provided by the institution to help them pursue their career objectives (Lent et al., 2009). Research with undergraduate students has shown that satisfaction is closely linked to academic achievement (Graunke and Woosley, 2005) and the certainty of career plans (Ware and Pogge, 1980).

Bandura (1986) concluded that students with higher satisfaction are more likely to achieve better performance in career decision-making. This is because academic achievement and emotional stimulation serve as fundamental sources for self-efficacy expectations. Those who have succeeded in previous career decision-making tasks, such as selecting a major, are likely to feel more effective in making decisions in the future.

On the other hand, a qualitative study conducted by Hallier and Summers (2011) with 24 students majoring in HRM and related disciplines in the UK revealed that HRM is a topic that generates significant debate in both theory and practice. Consequently, the curriculum is often designed to incorporate a balance of theory and practical application, aiming to equip students comprehensively with knowledge and increase their satisfaction with the field. However, students' direct exposure to human resources professionals is often limited before graduation, which can result in a mismatch between their career expectations and their desired first company of employment. Nevertheless, Hallier and Summers (2011) also confirmed that students' career choice intentions in HRM remain consistent throughout their university studies. Thus, within the scope of this research, which focuses on undergraduate students majoring in Human Resource

Management, and considering the evidence from the aforementioned studies, the research team aims to explore the relationship between satisfaction in learning and career choice intentions, and therefore testing a mediating role of academic satisfaction between peer pressure and career choice intention. Consequently, the research team proposes a hypothesis regarding the mediating role of satisfaction in learning:

**Hypothesis 3 (H3):** Academic satisfaction has a positive influence because peer pressure will positively affect the intention to choose a career among students majoring in HRM in Vietnam.



**Figure 1. Proposed research model**

*Source: Compiled by the authors*

### 3. RESEARCH METHODS

#### 3.1. Quantitative methods

Quantitative method was employed in this research due to its relevance to the field of educational psychology and the novelty of the topic in Vietnam. The use of quantitative methods ensures the safety and confidentiality of participants and allows for easy access to data, thereby ensuring the objectivity of the research. Quantitative methods have been widely used in educational psychology research, including studies on peer pressure such as those conducted by Mtemeri (2020), Ogutu et al. (2017), Naz (2014), and Naz (2014).

#### 3.2. Research sample

According to Hair et al. (1998), the sample size should be greater than or equal to 100, and the minimum sample size should be  $n=5*k$ , where  $k$  represents the number of observed variables corresponding to the research questions. Roger (2006) suggests a minimum sample size of 150-200 for practical research. Considering that, this study involves 25 observed variables, the minimum sample size is calculated as  $25*5=125$ . A total of 259 students majoring in HRM at Thuongmai University participated in the survey, which was conducted online through Google Forms (164 responses) and through direct surveys (94 responses). However, there was one invalid response, resulting in a total of 258 valid responses.

#### 3.3. Data collection

The questionnaire was designed based on synthesized research materials from previous studies. After the survey was completed, a total of 259 students from Thuongmai University participated and completed the questionnaire.

#### 3.4. Measures

The research team adopted scales from previous studies and self-translated them into Vietnamese to suit students majoring in HRM in Thuongmai University.

##### 3.4.1. Peer pressure scale

The peer pressure scale was based on the Peer Pressure Inventory scale by Clasen and Brown (1985) and the Peer Pressure Index by Brown et al. (1986). After comparing the two scales, the research team selected 12 representative questions to create a concise peer pressure scale. The observed variables related to negative behaviors (such as drug use, alcohol, and pre-matured sex) were excluded from the scale, as they were more appropriate for Clasen and Brown's scale targeting students from 7th to 12th grade. For university students, the research team included the observed variable "Using stimulants, addictive

substances (alcohol, beer, tobacco...)” (P11- see Appendix A) as an indicator of conformity to peer norms. The Peer Pressure scale was measured using a 5-point Likert scale and coded from PP1 to PP12.

**3.4.2. Academic satisfaction scale**

The scale for academic satisfaction was derived from the study by Chau and Cheung (2018). It consisted of 9 observed variables, reflecting students’ interest and engagement in learning activities (Ryan and Deci, 2000), and representing faculty expectations regarding the depth, breadth, and diversity of learning measures. The Academic satisfaction scale employed a 5-point Likert scale and was coded from AS1 to AS9.

**3.4.3. Career choice intention scale**

Career choice intention scale was adapted from the study on career goals by Tsaour et al. (2015), with a reliability of 0.85. This scale was chosen to capture students’ career intentions, as it clearly reflected their will and goals when selecting a career. While the original scale by Tsaour et al. (2015) focused on hotel and restaurant students in China, the research team modified the content to better suit the target group of this study, which consists of students in the field of Human Resource Management. The scale comprised 4 questions, coded from CG1 to CG4, and was measured using a 5-point Likert scale.

**3.5. Data analysis**

Data analysis was performed using SPSS 22 and Jamovi 2.3.21 software. The analysis involved descriptive statistical analysis, scale analysis and validation, exploratory factor analysis (EFA), the mediation model testing.

**4. RESEARCH RESULTS**

**4.1. Descriptive statistics**

**4.1.1. Descriptive statistics by gender**

The analysis of the survey participants’ gender revealed that out of 258 participants, 32 were males (12.4%) and 226 were females (87.6%).

**4.1.2. Descriptive statistics by university level**

Regarding the university level, the majority of participants were 2nd and 3rd year students. Specifically, 99 participants were in their 2nd year (38.2%), and 97 participants were in their 3rd year (37.5%).

**4.1.3. Descriptive statistics of peer pressure, academic satisfaction and career choice intention**

**Table 1. Descriptive statistic of peer pressure, academic satisfaction and career choice intention**

	N	Minimum	Maximum	Mean	Std. Deviation
PP	258	1	5	2.37±3.78	1,000±1.390
AS	258	1	5	3.05±3.84	0.095±1.004
CG	258	1	5	3.32±3.93	0.984±1.039
Valid N (listwise)	258				

*Source: Synthesized results from SPSS 22*

Analyzing the levels of agreement for different variables, it was found that for the Peer Pressure (PP) variable, PP5 had the highest level of agreement (3.78), while PP11 (alcohol, beer, tobacco...) had the lowest level of agreement (2.37). For the Academic Satisfaction (AS) variable, AS6 had the highest agreement level (3.84), and AS1 had the lowest agreement level (2.37). In terms of the Career Choice Intention (CG) variable, CG4 had the highest agreement (3.93), and CG2 had the lowest agreement (3.32).

## 4.2. Scale reliability

### 4.2.1. Cronbach's Alpha reliability analysis

**Table 2. Cronbach's Alpha coefficients**

No.	Variable	The number of observed variables remaining	Cronbach's Alpha (last run)	Correlated Item-Total Correlation (minimum-maximum)	Number of eliminated variables
1	PP	12	0.866	0.310; 0.661	0
2	CG	4	0.886	0.642; 0.828	0
3	AS	9	0.865	0.502; 0.670	0

Source: Synthesized results from SPSS 22

Cronbach's Alpha coefficient was calculated to test the reliability of the scales. The variable PP, AS, and CG all met the requirements, with correlation coefficients greater than 0.3 and Cronbach's Alpha coefficients greater than 0.6. This indicates that the variables have good and reliable scales.

### 4.2.2. Exploratory Factor Analysis (EFA)

#### 4.2.2.1. Peer pressure (PP) variable

We used the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy to examine whether the number of items per factor were adequate. According to theory, the KMO coefficient must reach a value of 0.5 or more ( $0.5 \leq \text{KMO} \leq 1$ ). In which, from the processed data, the coefficient  $\text{KMO} = 0.855$  has meet the conditions of the test ( $0.5 \leq \text{KMO} \leq 1$ ).

**Table 3. KMO and Bartlett's Test of PP scale**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.855
Bartlett's Test of Sphericity	Approx. Chi-Square	1319.377
	df	66
	Sig.	.000

Source: Synthesized results from SPSS 22

The total extracted variance was 64.769%, exceeding the 50% threshold, indicating the suitability of the EFA model. The Eigenvalue of 1.145 also met the criterion of being greater than 1. Three factors were extracted from the 12 original factors, which accounted for 64.769% of the observed variables.

**Table 4. Total Variance Explained of PP scale**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.067	42.227	42.227	5.067	42.227	42.227	2.879	23.992	23.992
2	1.560	13.003	55.230	1.560	13.003	55.230	2.723	22.692	46.683
3	1.145	9.539	64.769	1.145	9.539	64.769	2.170	18.085	64.769
4	.807	6.724	71.493						
5	.670	5.582	77.074						
6	.586	4.882	81.957						
7	.459	3.821	85.778						
8	.434	3.618	89.395						
9	.389	3.239	92.634						
10	.351	2.925	95.559						
11	.297	2.473	98.032						
12	.236	1.968	100.000						
Extraction Method: Principal Component Analysis									
Source: Synthesized results from SPSS 22									

The factor rotation matrix showed satisfactory convergence and discriminant values, with most variables having loading coefficients greater than 0.3. The three factors were named as follows:

PPa: Peer and school involvement (PP1, PP3, PP5, PP6, PP7)

PPb: Pro-adult behavior (PP4, PP8, PP9, PP10)

PPc: Conformity to peer norms (PP2, PP11, PP12)

**Table 5. Rotated Component Matrix<sup>a</sup> of PP variable**

	Component		
	1	2	3
PP5	.821		
PP3	.758		
PP7	.691		
PP6	.640		
PP1	.633		
PP8		.825	
PP9		.822	
PP10		.806	
PP4		.524	
PP11			.812
PP12			.809
PP2			.689
Extraction Method: Principal Component Analysis.			
Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 5 iterations.			

Source: Synthesized results from SPSS 22

**Table 6. Comparison of PP scales**

Variables	Clasen and Brown (1985)	Brown et al (1986)	Research results
PP1	Conformity to peer norms	Conformity to peer norms	PPa
PP2	Conformity to peer norms	Conformity to peer norms	PPc
PP3	Peer involvement	Social involvement	PPa
PP4	Peer involvement	-	PPb
PP5	School involvement	Pro-adult behavior	PPa
PP6	School involvement	-	PPa
PP7	School involvement	-	PPa
PP8	School involvement	Social involvement	PPb
PP9	School involvement	Social involvement	PPb
PP10	Family involvement	Pro-adult behavior	PPb
PP11	Misconduct	Misconduct	PPc*
PP12	Conformity to peer norms	Conformity to peer norms	PPc

Source: Compiled by the authors

From the comparison table, it can be seen that the observed variable PP11 belongs to the conformity to peer norms group. This factor indicates that university students tend to imitate and follow certain behaviors that are considered standards, enhancing their image in the eyes of peers of the same age. The comparison table also shows that the significance of the variable group PPa and PPb does not vary significantly compared to the original scale.

4.2.2.2. Academic satisfaction (AS) variable

The coefficient KMO = 0.860 of AS has meet the conditions of the test ( $0.5 \leq KMO \leq 1$ ).

The total extracted variance is 61,725% > 50%, showing that the EFA model is suitable. Eigenvalue is a commonly used criterion to determine the number of factors in the EFA, the Eigenvalue of 1,178 > 1 is satisfactory. Thus, out of 9 factors, only 2 factors can be considered satisfactory in the test with the best summary information. Thus, 2 factors are extracted to summarize 61.725% variation of observed variables.

The above matrix has ensured the conditions of convergence and discriminant values and the most important thing is that there is no variable loading in both factors or no variable without loading coefficient, most of them have load is greater than 0.3.

#### 4.2.2.3. Career choice intention (CG) variable

The coefficient KMO = 0.816 of CG has satisfied the conditions of the test ( $0.5 \leq \text{KMO} \leq 1$ ).

The total extracted variance is 74.556 % > 50%, showing that the EFA model is suitable. Eigenvalue is a commonly used criterion to determine the number of factors in the EFA, the Eigenvalue of 2.982 > 1 is satisfactory. Thus, out of 4 factors, only 2 factors can be considered satisfactory in the test with the best summary information. Thus, one factor is extracted to condense 74.556% of the observed variables.

#### 4.2.3. Pearson correlation analysis

**Table 7. Correlations**

		PPa	PPb	PPc	ASa	ASb	tb_CG
PPa	Pearson Correlation	1	.600**	.366**	.409**	.427**	.300**
	Sig. (2-tailed)		.000	.000	.000	.000	.000
	N	259	259	259	258	258	258
PPb	Pearson Correlation	.600**	1	.396**	.414**	.392**	.281**
	Sig. (2-tailed)	.000		.000	.000	.000	.000
	N	259	259	259	258	258	258
PPc	Pearson Correlation	.366**	.396**	1	.149*	.356**	.098
	Sig. (2-tailed)	.000	.000		.016	.000	.118
	N	259	259	259	258	258	258
ASa	Pearson Correlation	.409**	.414**	.149*	1	.603**	.526**
	Sig. (2-tailed)	.000	.000	.016		.000	.000
	N	258	258	258	258	258	258
ASb	Pearson Correlation	.427**	.392**	.356**	.603**	1	.460**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	258	258	258	258	258	258
tb_CG	Pearson Correlation	.300**	.281**	.098	.526**	.460**	1
	Sig. (2-tailed)	.000	.000	.118	.000	.000	
	N	258	258	258	258	258	258
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

Source: Compiled by the authors

*Linear correlation between the “Peer and school involvement” (PPa), “Pro-adult behavior” (PPb) and “Conformity to peer norms” (PPc) and “Career choice intention” (CG)*

The correlation relationship between the independent variable PPa and the dependent variable CG has sig.<0.05 and has  $0 \leq r = 0.300 \leq 1$ . This shows that the independent variable PPa has a linear correlation with the dependent variable CG with the level average correlation .

The correlation relationship between the independent variable PPb and the dependent variable CG has sig. <0.05 and have  $0 \leq r = 0.281 \leq 1$ . This shows that the independent variable PPb has a linear correlation with the dependent variable CG with a weak correlation .

The correlation relationship between the independent variable PPc to the dependent variable CG has sig.>0.05 and has  $0 \leq r = 0.098 \leq 1$ . This shows that the independent variable PPc has no linear correlation with the CG variable.

Linear correlation between “Academic satisfaction” (AS) and “Career choice intention” (CG)

The correlation relationship between AS and CG has sig.<0.05 and has  $0 \leq r = 0.553 \leq 1$ , showing that AS has a linear correlation with the CG with a strong degree (determined on r).

Linear correlation between “Peer and school involvement” (PPa), “Pro-adult behavior” (PPb) and “Conformity to peer norms” (PPc)

The independent variables PPa, PPb and PPc are linearly correlated with each other with sig. <0.05; where r of PPa and PPb, PPa and PPc and PPb and PPc are 0.601, 0.368, 0.396, respectively. The correlation level of PPa and PPb is strong correlation, the correlation level of PPa and PPc, PPb and PPc is the average correlation.

Linear correlation between “Peer and school involvement” (PPa), “Pro-adult behavior” (PPb) and “Conformity to peer norms” (PPc) with “Academic satisfaction” (AS)

PPa, PPb and PPc all have a linear correlation with AS with sig. <0.05; where r of PPa and AS, PPb and AS, PPc and AS are 0.466, 0.451, 0.272, respectively. The correlation level of PPa and AS, PPb and AS is moderate correlation and the correlation level of PPc and AS is weakly correlated.

**4.2.4. Model testing**

**Table 8. Model testing result**

Effect	Estimate	SE	95% C.I. (a)		$\beta$	z	p
			Lower	Upper			
<b>Indirect effect</b>							
PPa $\Rightarrow$ AS <sub>tb</sub> $\Rightarrow$ tb_CG	0.1654	0.0428	0.0815	0.2493	0.1546	3.864	< .001
PPb $\Rightarrow$ AS <sub>tb</sub> $\Rightarrow$ tb_CG	0.1166	0.0346	0.0487	0.1845	0.1326	3.365	< .001
PPc $\Rightarrow$ AS <sub>tb</sub> $\Rightarrow$ tb_CG	0.03	0.0272	-0.0234	0.0834	0.0348	1.102	0.271
<b>Direct effect</b>							
PPa $\Rightarrow$ tb_CG	0.0639	0.0726	-0.0783	0.2062	0.0598	0.881	0.378
PPb $\Rightarrow$ tb_CG	0.0348	0.0598	-0.0825	0.152	0.0395	0.581	0.561
PPc $\Rightarrow$ tb_CG	-0.0727	0.0494	-0.1695	0.024	-0.0842	-1.473	0.141
<b>Total effect</b>							
PPa $\Rightarrow$ tb_CG	0.2293	0.0801	0.0723	0.3864	0.2143	2.862	0.004
PPb $\Rightarrow$ tb_CG	0.1513	0.0667	0.0206	0.282	0.1721	2.269	0.023
PPc $\Rightarrow$ tb_CG	-0.0427	0.0563	-0.153	0.0676	-0.0495	-0.759	0.448

Note. Confidence intervals computed with method: Standard (Delta method)  
 Note. Betas are completely standardized effect sizes

Source: Synthesized results from Jamovi 2.3.21

The mediating model was performed to evaluate the role of the mediating variable AS based on the impact of the independent variable PPa; PPb; PPc with dependent variable CG. The results show that the total impact of variable PPa and variable PPb on CG is significant.

Total direct impact of variable PPa on variable CG with  $\beta = 0.2143$ ,  $t = 2.862$ ,  $p = 0.004$ . Total direct effects of variable PPb on variable CG with  $\beta = 0.1721$ ,  $t = 2.269$ ,  $p = 0.023$ . Total direct impact of variable PPc with dependent variable CG with  $\beta = -0.0495$ ,  $t = -0.759$ ,  $p = 0.448 > 0.05$ .

Indirect impact of variable PPa on variable CG through variable (AS) with  $\beta = 0.1546$ ,  $t = 3.864$ ,  $p < .001$ . Indirect impact of variable PPb on variable CG through variable AS with  $\beta = 0.1326$ ,  $t = 3.365$ ,  $p <$



.001. Indirect impact of variable PPc on variable CG through variable AS with  $\beta = 0.0348$ ,  $t = 1.102$ ,  $p = 0.271 > 0.05$ .

From the above results, it can be seen that the impact of PPc on CG is not significant, either directly or indirectly through AS. Through the above table, we can see the direct impact of variables PPa, PPb on CG; In addition, it also showed the role of AS mediator when showing the indirect impact of PPa, PPb on CG.

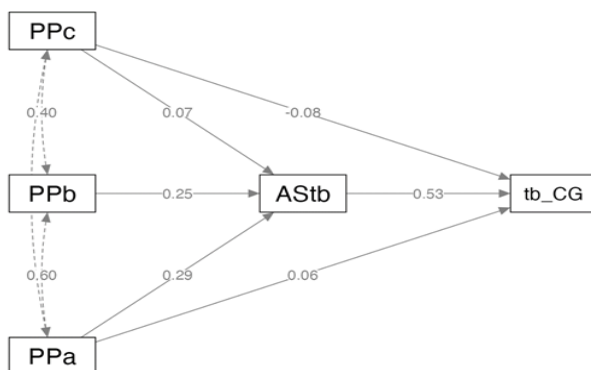


Figure 2. Research model

Source: Summary of results from Jamovi 2.3.21

## 5. DISCUSSION AND IMPLICATIONS

### 5.1. Discussion

#### 5.1.1. Impact of peer pressure on academic satisfaction

The research findings indicate that the independent variables, “Peers and school involvement” (PPa) and “Pro-adult behavior” (PPb), have a positive impact on the mediating variable “Academic satisfaction” (AS). However, the variable “Conformity to peer norms” (PPc) does not have any impact on AS.

Among the independent variables, PPa has a stronger impact on AS compared to PPb, as evidenced by a higher beta coefficient ( $0.2914 > 0.2499$ ).

Therefore, hypothesis H1, which states that peer pressure has a positive impact on the academic satisfaction of students in the HRM major in Vietnam, is partially supported. These findings align with previous research by Wentzel and Brophy (2014) and Tope (2011), which suggest that students who receive support and care from friends tend to have higher motivation and satisfaction in their learning.

#### 5.1.2. Impact of peer pressure on career choice intention

The results demonstrate that the independent variables “Peers and school involvement” (PPa) and “Pro-adult behavior” (PPb) directly impact the dependent variable “Career choice intention” (CG). Specifically, PPa has a stronger impact on CG compared to PPb, indicated by a higher beta coefficient ( $0.0598 > 0.0395$ ).

Thus, hypothesis H2, which posits that peer pressure positively affects the career choice intention of students majoring in HRM in Vietnam, is partially supported. These findings suggest that for students in the HRM field, factors related to friends and school, such as participating with friends and attending school, have a strong positive influence on their career choice intentions. These results align with the research conducted by Ogutu, Odera, and Maragia (2017), who found that peer pressure significantly influences students’ career decision-making. It is recommended to raise awareness among students about the role peer pressure plays in career decision-making.

However, these findings are not consistent with the results of Nguyen Kim Nhung and Luong Thi Thanh Vinh (2018) and Seema Arif et al. (2019), who argue that the influence of friends is not statistically

significant when assessing factors affecting career choice. Instead, they suggest that family factors have a stronger impact on students' career choices.

### **5.1.3. The mediating role of academic satisfaction**

The study findings indicate that the mediating variable “Academic satisfaction” (AS) has a significant impact on the dependent variable “Career choice intention” (CG), as reflected by a Beta coefficient of 0.5304.

This result demonstrates the mediating role of academic satisfaction in the relationship between peer pressure and career choice intention. However, the mediating role of academic satisfaction is only partial. Both the independent variables “Participating with friends, attending school” (PPa) and “Professional behavior, maturity” (PPb) directly influence career choice intention without being mediated by academic satisfaction.

Furthermore, the variable “Academic satisfaction” (AS) does not mediate the relationship between the variable “Compliance with the standards of friends” (PPc) and the variable “Career choice intention” (CG).

Therefore, hypothesis H3, which suggests that academic satisfaction has a positive influence on career choice intention as peer pressure positively affects the intention to choose a career for students majoring in HM in Vietnam, is partially supported. However, these findings differ from the study conducted by Hallier and Summers (2011), who found that the intention to choose a career for students majoring in HRM remains unchanged during their university studies..

## **5.2. Implications**

### **5.2.1. Theoretical implications**

The present research theoretically emphasizes the positive aspects of peer pressure, a social phenomenon that is commonly perceived as negative. Existing literature has limited studies evaluating the significance of peer pressure's positive influences. Therefore, this research fills a gap in the literature by examining a new group of participants, specifically university students. The research findings also demonstrate that peer pressure does indeed have impacts on their academic lives and prospective careers. The outcomes, whether negative or positive, depend on the behaviors they perceive and imitate. This concept, is again closely related to social learning theory of Bandura (1977) and needs to be examine further in future peer pressure and higher education research. Furthermore, based on this research, there is a critical need to develop a new scale that effectively defines and measures the behaviors of university students.

### **5.2.2. Practical implications**

Based on the research results, the research team proposes several solutions to help students majoring in HRM in Vietnam overcome the influence of peer pressure and enhance academic satisfaction and career choice intention effectively:

#### **5.2.2.1. For students**

Firstly, it is important for students to build motivation and self-discipline in their studies. This can be achieved by setting clear and specific learning goals, creating detailed learning plans, and understanding their own abilities and limitations. By doing so, students can transform the pressure they feel into positive motivation, driving them to become better versions of themselves.

Creating an inspiring learning environment is also crucial. Students should be encouraged to learn together, share their perspectives, and grow collectively. It is important for students not to force themselves into activities that they are not suited for or that go against their true interests, simply because their peers excel in those areas.

Balancing listening and sharing is another effective approach to reducing peer pressure in both academic and personal environments. By actively participating in discussions and exchanging experiences with others, students can alleviate the pressure they feel and gain a broader perspective on their own choices and decisions.

#### *5.2.2.2 For lecturers*

In terms of the role of lecturers, it is essential for them to incorporate interactive activities and games related to the subject matter to make the learning process more engaging and enjoyable. They should also provide opportunities for students to express their opinions and apply theoretical knowledge to practical situations. Additionally, teachers should adopt teaching methods that make students feel comfortable and provide guidance and career orientation to assist students in making informed decisions about their future careers.

#### *5.2.2.3. For the school*

At the institutional level, schools can establish a psychological counseling department to provide support and guidance to students in expressing their thoughts, addressing difficulties, and managing stress and fatigue. It is also beneficial to organize events and projects that allow students to develop themselves and acquire new skills. Furthermore, schools can develop training programs and seminars, particularly for final-year students, with the participation of businesses. Extend the duration of internships and provide more opportunities for practical experience to aid students in making career choices.

Based on the research by Hallier and Summers (2011) on building professional “identity” in the HRM field, the research team suggests incorporating additional career planning and management methods to help students establish themselves in their chosen profession. This will contribute to the availability of high-quality human resources in the labor market and support the growth of the profession.

#### *5.2.2.4. For employers*

First and foremost, establishing collaborations between enterprises and educational institutions is crucial. This collaboration can involve developing criteria for evaluating internships, leading to an improved assessment process for student performance. Additionally, it is important to focus on creating suitable career paths, diversifying training methods, and offering competitive employee benefits. These measures will contribute to the enhancement of both professional and soft skills development for students.

Furthermore, organizing supplementary programs such as team-building activities, exchanges, and training sessions can play a significant role in fostering excitement and facilitating the acquisition of professional knowledge and soft skills. These programs provide valuable opportunities for students to develop their abilities and improve their overall competence. By implementing these proposed solutions, it is anticipated that students in the field of HRM will be better equipped to navigate peer pressure, experience increased academic satisfaction, and make well-informed career choices.

It is important to emphasize that the success of these initiatives relies on the collaboration and collective efforts of students, lecturers, schools, and employers. By creating a supportive and conducive environment that promotes cooperation and mutual understanding, all stakeholders can contribute to the holistic development of students and prepare them for successful futures in the field of HRM.

### **5.3. Limitations of the study and suggestions for future research**

#### ***5.3.1. Limitations of the study***

The study has a number of limitations that should be acknowledged. Firstly, the sample size was small, comprising only 259 students from the Faculty of Human Resources Management at Thuongmai

University. This limited sample size may affect the generalizability of the findings. Additionally, the scales used in the study were self-translated from English to Vietnamese by the research team, potentially leading to translation errors or discrepancies from the original scales. Moreover, the study did not comprehensively define and explore specific behaviors representing misconduct among university students, which may limit the understanding of peer pressure within this age group. Furthermore, the influence of gender on the relationship between peer pressure, academic satisfaction, and career choice intention was not clarified in the study.

### **5.3.2. Suggestions for developing topics for future research**

For future research, it is suggested to address these limitations and expand the research scope. Firstly, further studies can delve into the personality characteristics of students in HRM and related fields in economics and business. Secondly, exploring the relationship between peer pressure and specific social behaviors, such as procrastination, motivation loss, social media addiction, and substance abuse, can provide valuable insights. Thirdly, focusing on the impact of peer pressure on mental health and emotional intelligence of Vietnamese students, while considering the influence of gender and regional cultural factors, would be beneficial. Lastly, expanding the research to include students from various industries and regions across the country would contribute to a more comprehensive understanding of peer pressure dynamics.

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## APPENDIX A. MEANING OF OBSERVED VARIABLES

### 1. Peer pressure scale (PP)

PP1	Join one or more groups (famous or unpopular) at school
PP2	Have the same hairstyle, wear the same clothes, or listen to the same music as my group of friends
PP3	Active in extracurricular activities (parties, sports, concerts, ...)
PP4	Spend a lot of free time with friends
PP5	Study hard and get good grades
PP6	My performance at school reflects my personality/ability
PP7	Participate in training sessions, improve experience, knowledge and skills
PP8	Do not skip class, skip school
PP9	Trying to finish college
PP10	Get along with your parents
PP11	Using stimulants, addictive substances (alcohol, beer, tobacco...)
PP12	Have actions and words like friends around

### 2. Academic Satisfaction scale (AS)

AS1	I enjoy studying more than most of my friends
AS2	I discover myself through learning
AS3	I feel proud to study at this university
AS4	My academic results are assessed objectively
AS5	Unbiased scoring process
AS6	Studying helps me get a lot of information and experience
AS7	The curriculum requires a lot of homework
AS8	The program gives me many topics to discuss and share thoughts on
AS9	I feel happy to take a class

### 3. Career choice intention scale (CG) in human resource management

CG1	After I graduate, I will definitely try to find a job in HR
CG2	No matter the difficulties, I will persistently pursue the job I want with the HR industry
CG3	I will definitely work in HR after I graduate
CG4	If a potential employer offers me a job in HR, I will gladly accept it

## **FACTORS IMPACT ON GREEN INNOVATION, COMPETITIVE COMPETITION AND OPERATION EFFICIENCY IN VIETNAM BUSINESSES IN DIGITAL ENVIRONMENT**

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*ABSTRACT: This study aims to analyze the impact of green innovation on the competitive advantage and organizational performance of Vietnamese enterprises. Data was collected from 625 questionnaires received from 32 Vietnamese enterprises. The data was then processed through SPSS 26 & AMOS 24 software. After that, descriptive statistics, EFA analysis, CFA analysis, SEM analysis, and Bootstrap test were used. The research results indicate that the factors affecting green innovation are technology, organization, and environment. In particular, factors related to the organization have the most decisive impact. Besides, green innovation impacts competitive advantage and performance within Vietnamese firms. In today's businesses, business performance takes into account the impact on the environment. Therefore, innovation of green processes and products has a positive impact on the performance of businesses.*

*The study also proposes some implications for managers to boost green innovation to achieve competitive advantages and operational efficiency of Vietnamese enterprises in the digital environment.*

*Keywords: Green innovation, operational efficiency, Vietnamese enterprises, digital environment*

### **1. INTRODUCTION**

In the present day, green innovation in the digital environment is becoming one of the models targeted by many businesses, in order to respond to new requirements, in line with the general development trend of the world, and at the same time improve the position of enterprises. Thus, increasing the competitiveness of enterprises in both domestic and foreign markets. Green innovation in the digital environment, especially green production, is a production process that is environmentally friendly from input materials to output products and does not cause harm to human health. According to the Department of Domestic Market - Ministry of Industry and Trade (2022): “In the face of the impacts of climate change, in the context of a heavily polluted environment, resources are gradually being exhausted, etc., a wave of consumption. Green production is spreading globally, green production is an inevitable trend and an important link in the green growth strategy. In Vietnam, green innovation is an important link to help Vietnam move towards a green and sustainable economy. Participating in the campaign of environmentally friendly green production and ensuring the health of consumers, in recent years, many Vietnamese businesses have been paying more attention to using natural materials, fuels and chemicals. non-toxic substances; invest in modern machinery, technology and equipment according to international standards to improve processes, towards green production. At the same time, invest in and install renewable energy systems to actively use clean energy, in addition to solutions to save electricity and water in the production process... as well as install a management system. Quality, safety and hygiene management and waste treatment system, aiming at green and clean production criteria” . Vietnamese enterprises in the digital environment are taking green innovation seriously at Vietnamese enterprises. This is evidence that promoting green innovation, competitive advantage and operational efficiency at Vietnamese enterprises has helped their human resources “shift from volume to substance”. Nevertheless, DARA (2020) indicated : “Economics

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is decrease 15 billions USD every year, equally 11% GDP because of climate changes”. Green innovation has received considerable attention, but it is still a modest number and has not really created a driving force for the economy. Thus, promoting green innovation in the digital environment to enhance the operational efficiency of Vietnamese enterprises will be an inevitable development trend, one of the top priorities to become the “life saving” methods. “The decision is a “golden opportunity” to make a breakthrough in labor productivity, competitive advantage, sustainable development in sustainable development, green economy development in the digital environment.

## **2. THEORETICAL BASIS, HYPOTHESIS AND RESEARCH MODEL**

### **2.1. Theoretical basis, hypothesis**

#### **Green innovator**

Weng & Lin (2011) suggested :“Green innovation is an effective way for businesses to solve problems of environmental impact. Based on stakeholder theory, businesses operate according to new standards to satisfy their key stakeholders. Weng et al., (2015) evaluated: “Company managers are interested in understanding the internal and external factors to promote green innovation implementation; For example, consider customer requirements or government environmental regulations as a key driver of green innovation, the way in which a company can comprehensively address stakeholders’ concerns. relevant to achieve business goals”. As such, green innovation aims at general purpose, pollution reduction, energy productivity, waste reduction, replacement of limited resources with sustainable and recyclable ones based on eco-friendly technologies. environment, operating processes towards greening and implementing sustainable development

Thus: “Green innovation of enterprises is the creation of technological innovation, using environmentally friendly technologies to help enterprises use energy most effectively, contribute to environmental protection, in order to increase labor productivity. , bringing operational efficiency and competitive advantages of enterprises”.

#### **Factors affecting green innovation**

##### **(i) Technological factors:**

According to Lin & Ho (2011): “Technological factors are often interested in green innovation technical documents of enterprises ”. Frambach & Schillewaert, 2002; Jeyaraj et al., 2006; Rogers, 2003 evaluated: “Some of the technological factors of innovation increase relative advantage, compatibility, complexity, reliability, observability, usefulness, information intensity.” Along with that, in the current new context, ever-evolving technology will create conditions to promote green innovation activities of enterprises faster and more effectively. From the research results, we make the following hypothesis:

##### **Hypothesis 1 (H1): Technology has a positive impact on green innovation of enterprises.**

##### **(ii) Organizational factors:**

Bambang et al (2020) nhận định: “Organizations can also be viewed as internal factors that have an impact on the adoption of green practices. Organizational factors are often analyzed in related research on environmental protection and technical innovation. There are many studies that have discussed the factors affecting the organization such as human resource quality, top leadership skills, organizational support, organizational culture and organizational size in terms of technical innovation. Business owners need to balance economic, environmental, and social issues in their business. In the era of sustainable development and enhanced environmental awareness, enterprises need to accept the green market orientation and

implement green innovation to achieve better business performance.” With Lee (2008); Lin & Ho (2011); Weng et al. (2015), Lin & Ho (2011); Lee et al. (2005), Phạm Anh Nguyễn (2022) also recognized that organizational factors have a positive impact on green innovation of enterprises. On that basis, the study proposes the following hypothesis:

**Hypothesis 2 (H2): Organization has a positive impact on green innovation of enterprises.**

**(iii) External environmental factors:**

Lin & Ho (2011); Weng et al. (2015); Guo et al. (2018), Phạm Anh Nguyễn (2022) suggested: “Influence of stakeholder pressures, in particular, customers and regulations, government support factors, and market changes as these are factors that are Previous research confirms the influence on the implementation of green innovation in enterprises.

**Hypothesis 3 (H3): External environmental factors have a positive impact on green innovation of enterprises.**

**Operational Efficiency**

According to the research results of Ar (2012): “Green product innovation has a significant positive effect on both the efficiency of the enterprise and its competitiveness. In other words, environmental management only plays a role in moderating the relationship between green innovation and enterprise efficiency. Financial performance is defined as a parameter that describes a company’s financial or quantitative performance, which is then used for comparisons against financial reporting standards and shows the company’s performance. company in the recent period in terms of financial aspect will be evaluated as a basis for other activities”. In today’s businesses, business performance takes into account the impact on the environment. Therefore, innovation of green processes and products has a positive impact on the performance of businesses.

From the research results, we put forward the following research hypothesis:

**Hypothesis 4 (H4): Green innovation has a positive impact on the performance of enterprises.**

**Competitive advantage**

Barney (1991) & Phạm Anh Nguyễn (2022) said that: “Businesses from green innovation can come up with policies suitable to the actual conditions of their organizations to develop businesses quickly and effectively. and sustainable, contributing a part to sustainable development. Green innovation helps businesses develop and maintain a competitive advantage, leveraging resources and competitive advantages for superior performance.” As such, businesses have realized the importance of environmental protection, which also brings a number of benefits to businesses besides environmental protection. With green applications both in products and processes, businesses have a cost advantage or gain special customer attention in effectively dealing with the environmental issue. From there, green innovation develops not only the operational efficiency of enterprises but also provides a competitive advantage.

From the research results, we put forward the following research hypothesis:

**Hypothesis 5 (H5): Green innovation has a positive impact on competitive advantage of enterprises.**

**Hypothesis 6 (H6): Competitive advantage has a positive impact on the performance of enterprises.**

## **2.2. Research Model**

From 6 hypotheses of the research model of factors affecting green innovation, competitive advantage, operational efficiency, in Vietnamese enterprises in the digital environment with the proposed research

model, there are 3 independent variables: technology, organization, external environment, 1 intermediate variable is green innovation, The 2 dependent variables are operational efficiency and competitive advantage. Research scales are inherited and developed by Lai et al. 2003; Wen and Chen, 1997, Chen 2008 and Chen et al. 2006, Lin & Ho, 2011, Kousar et al. 2017, Pham Anh Nguyen 2022, Ehr Gott et al., Lopez-Gamero et al., 2010; Liu, 2009, Zhao et al., 2015, Cooper et al. 1994, Avlonitis et al. 2001, Pham Anh Nguyen 2022.... The Likert scale is 5 points: where 1 is strongly opposed and 5 is strongly agreed.

The Green Innovation Capacity Scale is inherited and developed from studies by Lai et al. 2003, Wen and Chen, 1997, Chen 2008 and Chen et al. 2006, Pham Anh Nguyen 2022... The scale is encoded from DM1→DM7 with 7 observation variables: DM1-DN prioritizes the use of materials that consume less resources and energy, DM2-DN will consider the reuse of products, DM3-DN applies energy conservation technologies; DM4-DN applies renewable resource technologies; DM5-DN applies technologies in pollution prevention process.

Technology scale inherited and developed from studies by Lin & Ho 2011, Kousar et al. 2017, Pham Anh Nguyen 2022... The measurement scale is encoded from CN1→CN7 with 7 observation variables: CN1-Green technology innovation suitable to current production and business activities of enterprises, CN2-Green technology innovation in accordance with the orientation of enterprises, CN3-Green technology innovation is easy to practice, CN4-Knowledge of green technology innovation is easy to share, CN5-Easy to evaluate green technology innovations, CN6-Green technology innovation takes time to become familiar, CN7-It takes less cost to be able to gradually get used to green technology innovation.

The organizational scale is inherited and developed from the studies of Lin & Ho, 2011; Lee et al., 2005, Pham Anh Nguyen 2022... The measurement scale is coded from TC1→TC6 with 6 observations including: TC1-DN encourages employees to learn knowledge about green innovation; TC2-DN considers the application of green innovation as an important strategic activity of the company; TC3-DN strongly supports employees' environmental protection efforts; TC4-Employees have the ability to learn new technologies easily; TC5-Employees trained in green knowledge; TC6-Employees are able to provide ideas on green innovation for enterprises

The environmental scale is inherited and developed from studies by Lin & Ho 2011, Lopez-Gamero et al. 2010; Liu, 2009; Zhao et al. 2015, Pham Anh Nguyen 2022... The scale is coded from MT1→MT7 with 7 observations including: MT1- enterprises will be sanctioned if they violate environmental regulations; MT2- enterprises feel pressure from monitoring environmental activities of local governments; MT3- Predicting competitor behavior is difficult; MT4-Client requests enterprises to improve environmental performance; MT5- Clients prefer businesses with strong environmental protection responsibilities, MT6- Clients request detailed information about environmental protection of other enterprises, MT7- Clients will stop supporting if enterprises do not produce green products.

The performance scale is inherited and developed from studies by Cooper et al., 1994, Avlonitis et al., 2001 Pham Anh Nguyen 2022... The measurement scale is encoded from HQ1→HQ6 with 6 observations including: HQ1- enterprises increase sales revenue, HQ2- enterprises increase profits significantly, HQ3- enterprises increase market share, HQ4- Financial value of enterprises is increased, HQ5- enterprises achieve customer loyalty/loyalty, HQ6- Enterprises increase employee loyalty.

The competitive advantage scale is inherited and developed from studies by Cooper et al., 1994, Avlonitis et al., 2001, Pham Anh Nguyen 2022... The measurement scale is encoded from LT1→LT5 with 6 observations including: LT1- Green technology innovation helps businesses feel an increased reputation/

brand, LT2- Green technology innovation helps businesses feel more creative products, LT3- enterprises have competitive advantages over direct competitors, LT4- The image of the enterprise is better than the image of direct competitors, LT5- The reputation of the enterprise is better than the reputation of competitors, LT5- The reputation of the enterprise is better than the reputation of competitors.

From 6 research hypotheses, the research model has a total of 38 observed variables, of which 3 independent variables are technology (CN), organization (TC), external environment (MT), 1 intermediate variable is green innovation (DM); The 2 dependent variables are operational efficiency (HQ) and competitive advantage (LT). The proposed model is below (see figure 1).

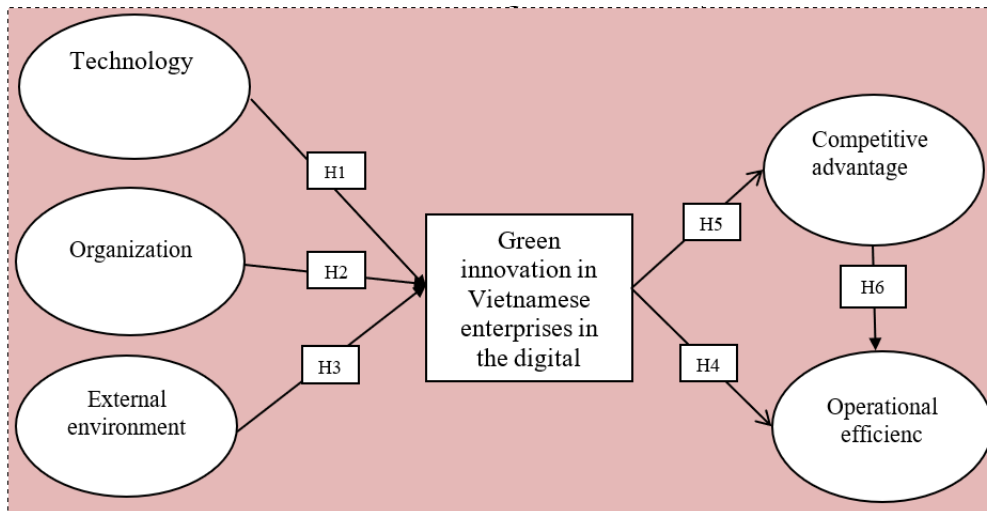


Figure 1. Proposed research model

Source: Compilation of authors

3. RESEARCH METHODOLOGY

The study was carried out through 2 qualitative and quantitative steps with 2 different groups of subjects. Respondents for qualitative research are experts and managers at 32 Vietnamese enterprises. The survey subjects of the quantitative study are managers and employees, who are implementing green innovation where they are working. From the synthesized theoretical basis, the observed variables are built on a 5-point Likert scale (from 1 = strongly disagree to 5 = strongly agree) reflecting 6 complete research concepts. Qualitative research through in-depth interviews with 10 experts with knowledge of green innovation of Vietnamese enterprises in the digital environment to supplement and adjust the above observed variables to be easy to understand and suitable to the context at Vietnamese enterprises. Qualitative research results help to form a quantitative questionnaire consisting of 38 observational variables, of which 3 are independent are technology, organization, external environment, 1 intermediate variable is green innovation; The 2 dependent variables are operational efficiency and competitive advantage. Summary of variables in the proposed model:

Table 1. Summary of variables in the model

Sequence number	Factors	Author
1	Technology	Lin & Ho, 2011, Kousar et al., 2017, Pham Anh Nguyen (2022)
2	Organization	Lin & Ho, 2011; Lee et al., 2005, Pham Anh Nguyen (2022)
3	External environment	Lin & Ho (2011), Ehr Gott and associates, Lopez-Gamero et al., 2010; Liu, 2009; Zhao et al., 2015, Pham Anh Nguyen (2022)

4	Green Innovation	Lai et al., 2003; Wen and Chen, 1997, Chen (2008) và Chen et al. (2006), Pham Anh Nguyen (2022)
5	Operational efficiency	Cooper et al., (1994); Avlonitis et al., 2001 Pham Anh Nguyen (2022)
6	C o m p e t i t i v e advantage	Cooper et al., (1994); Avlonitis et al., 2001, Pham Anh Nguyen (2022)

*Source: Compilation of authors*

According to Hair et al. (1998), as a rule of thumb, the sample size should be greater than or equal to 100 and the smallest sample should have the desired ratio and  $n = 5*k$ , where  $k$  is the number of observed variables equivalent to the number of questions studied. On the other hand, according to Roger (2006) the minimum sample size applied in practice research is 150-200 observations. Thus, this study has 34 observations so the minimum sample size is  $38*5 = 190$ . To ensure the representativeness of the study, the team tried to collect the largest number of questionnaires possible. Quantitative research was conducted immediately after with a sample size of 750 from managers and employees at 32 enterprises, including 06 textile and garment enterprises, 03 fishery enterprises; 05 Electronic enterprises; 09 Commercial banks; 06 Information Technology Enterprises, 03 Telecommunications Companies. These enterprises are in Hanoi, Bac Ninh, Nam Dinh, Thai Nguyen, Bac Giang, Hai Phong, Nghe An, Hue, Da Nang, Nha Trang, Ho Chi Minh City, Dong Nai ... in Hanoi, Bac Ninh, Da Nang, Ho Chi Minh City. The period is from 1/08/2022-1/09/2022. Reach survey subjects in 2 ways: (i) Send surveys designed on Google doc to email addresses of employees and managers at enterprises; (ii) Send the survey directly to employees and managers at enterprises. Then 671 votes were obtained after screening the answer sheets, eliminating 46 invalid votes (due to lack of information) and the remaining 625 valid votes used by the author group to enter and process data. The survey data is then imported into an Excel file, then analyzed the data using SPSS 26 and AMOS version 24 software. Specifically, SPSS software is used for descriptive statistical analysis, reliability analysis of Crobach's Alpha scale, AMOS software is used for EFA, CFA factor analysis, SEM linear structure analysis, Bootstrap test.

## 4. RESEARCH RESULTS

### 4.1. Characteristics of the study sample

Out of 625 questionnaires collected from 32 Vietnamese enterprises, 54.88% were female, 45.12% were male; In terms of age, respondents were mainly between the ages of 35-45 years old, accounting for 52.16%, while the age group from 23-35 years old accounted for the remaining 35.84% and over 45 years old. Thus, the main subjects of the investigation are managers and employees who have working experience and are quite knowledgeable about the factors affecting green innovation, competitive advantage, and operational efficiency in Vietnamese enterprises. in the digital environment; Regarding the level of survey subjects, mainly university and postgraduate is 58.88%. Thus, most of the survey subjects are qualified to deeply understand the factors affecting green innovation, competitive advantage, and operational efficiency in Vietnamese enterprises in the digital environment; Regarding the working position, the survey results show that 19.04% of respondents are managers and 80.96% of respondents are employees. In particular, employees will be the main subjects of green innovation, along with that, managers will also assess the factors affecting green innovation, competitive advantages, operational efficiency, in enterprises. Vietnam; Regarding the type of enterprises, the survey showed that 19.52% are large-scale enterprises, 80.48% are small and medium-sized enterprises. This is consistent with the characteristics of Vietnamese enterprises in the digital environment, mainly small and medium sized enterprises.

**4.2. Check the reliability of the scale**

According to Nguyen Dinh Tho & Nguyen Thi Mai Trang (2009): “The purpose of the scale analysis is to see if the scale has discriminatory value and reliability. The scales are evaluated through the main tool which is Cronbach’s Alpha coefficient. Before conducting EFA factor analysis, we will use Cronbach’s Alpha reliability coefficient method to eliminate some inappropriate variables. When evaluating the reliability of the scale, it is necessary to satisfy: Select the scale when the reliability Alpha is greater than 0.6. The larger the alpha, the higher the intrinsically consistent reliability”; Hoang Trong and Chu Nguyen Mong Ngoc (2005) research: “The value of Alpha: greater than 0.8 is a good scale; from 0.7 to 0.8 are usable; from 0.6 or more can be used and the observed variables have small variable-total correlation coefficient, specifically less than 0.3”. Thus, the reliability of the scales JR, TD, ER, CI, OE, SD satisfies the requirements used for EFA factor analysis (see Table 2).

**Table 2. Cronbach’s Alpha coefficient of the scales**

	Element	The number of observed variables remaining	Cronbach’s Alpha	Total variable correlation coefficient (minimum-maximum value)	Number of variables eliminated
1	CN	7	0,857	0,423; 0,692	2
2	TC	6	0,825	0,521; 0,637	1
3	MT	7	0,802	0,435; 0,616	1
4	DM	7	0,859	0,496; 0,655	1
5	LT	6	0,778	0,437; 0,693	2
6	HQ	6	0,826	0,412; 0,628	1

Source: Summary of results from SPSS 26 and Amos 22

**4.3. EFA exploratory factor analysis**

The criteria used when running EFA are: KMO coefficient >0.5, significance level sig <0.05, principal axis factoring extraction method with promax rotation is used and the breakpoint when extracting factors with Eigenvalue > 1 is used. use.

**Table 3. KMO and Bartlett’s Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.850
Bartlett’s Test of Sphericity	Approx. Chi-Square	3896.556
	df	231
	Sig.	.000

Source: Analysis results from SPSS 26

KMO coefficient = 0.850 > 0.5, Significance level sig = 0.000 < 0.05, Data suitable for EFA factor analysis, significance level sig <0.05, so it can be concluded that observed variables are correlated with each other. Besides, the proposed factors explain 59.87% of the variables with the stopping method used with Eigenvalues reaching 3,176.

**Table 4. Pattern Matrix<sup>a</sup>**

	Factor					
	1	2	3	4	5	6
TC1	.726					
TC6	.702					
TC5	.701					
TC2	.645					

TC3	.586					
HQ2		.882				
HQ3		.721				
HQ5		.720				
HQ1		.579				
DM5			.785			
DM2			.676			
DM1			.619			
DM6			.565			
MT5				.758		
MT1				.630		
MT6				.622		
MT3				.602		
CN5					.844	
CN7					.728	
LT5						.673
LT4						.568
LT6						.562

Source: Summary of results from SPSS 26

Through the first 3 regression runs, a total of 22 observations were accepted and the remaining 8 observed variables were removed, including: organization (TC1, TC6, TC5 TC2, TC3), operational efficiency (HQ2, HQ3, HQ5, HQ1), green innovation (DM5, DM2, DM1, DM6), external environment (MT5, MT1, MT6), technology (CN5, CN7), competitive advantage (LT5, LT4, LT6). Observed variables: CN1, CN2, MT2, MT4, LT1, HQ4, DM4, DM7 with weight < 0.5 do not satisfy the condition, so they are excluded from the model.

#### 4.4. The results of confirmatory factor analysis CFA

Is the CFA analysis to see if the measurement model of the concepts used in the study is satisfactory? Do the scales meet the requirements of a good scale?

Steiger (1998) said that: The evaluation criteria include: unidirectionality, convergent value, discriminant value and theoretically related value. Criteria from 1 to 3 are evaluated in the critical scale model, while the theoretical correlation value is evaluated in the model". Therefore, the CFA test group with 6 factors includes 25 observed variables to consider the fit of the model with market data.

The results of CFA analysis show that this model has 194 degrees of freedom. Figure 2 shows the value of the Chi-squared index = 446,427 with a p=000 value. Other indicators: Chi-squared/df = 2.301, GFI, TLI, CFI are all higher than 0.9 (Bentler & Bonett, 1980), RMSEA = 0.050 < 0.08 (Steiger, 1998), this can be model is considered to be consistent with market data.

Evaluation of composite reliability (PC), total variance (PVC) and Cronbach's Alpha coefficient. PC and PVC must meet the requirements  $\geq 0.5$ , Cronbach's Alpha coefficient must be  $\geq 0.6$  and the total variable correlation coefficient must be higher than 0.3.

Unidirectional/monad: CFA analysis for this model has 194 degrees of freedom. Figure 2 shows the value of the Chi-squared index = 446,427 with a p=000 value. Other indicators: Chi-squared/df = 2.301, GFI, TLI, CFI are all higher than 0.9 (Bentler & Bonett, 1980), RMSEA = 0.050 < 0.08 (Steiger, 1998), -> This gives us the necessary and sufficient conditions for the set of observed variables to be unidirectional (Steenkamp & Van Trijp, 1991).

Convergence value: For the weights (normalized) all > 0.5, it proves that the scale of concepts all achieve convergent value (if there is any observed variable with weight < 0.5, it is necessary to turns out but this model is not available)

Discriminant value: The correlation coefficient between the research concepts in the model is positive and < 1 and different from 1 (based on the above table), the P-value is very small and < 0.05, so The correlation coefficient of each pair of concepts is different from 1 at the 95% confidence level. Therefore, the research concepts in this model have gained discriminant value.

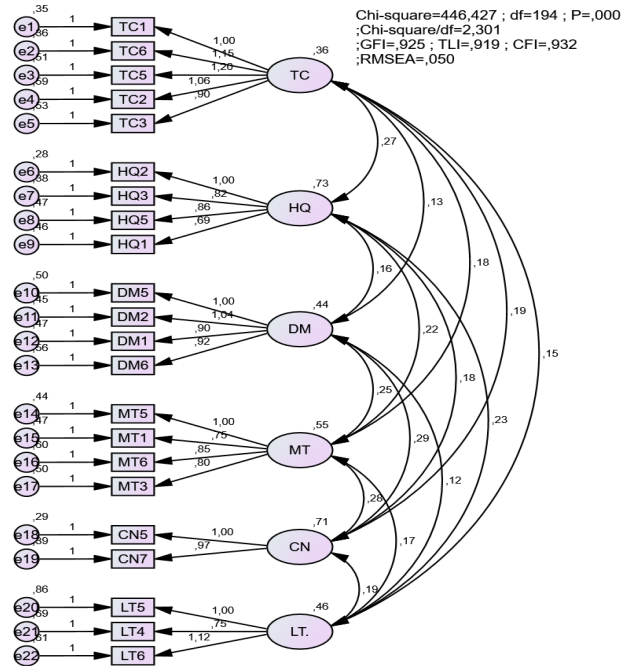


Figure 2. Confirmatory factor analysis (CFA) results (normalized)

Source: Synthesized results from the analysis of SPSS 26 and Amos 24

#### 4.5. The results and suppositions of the study

The results of the SEM model analysis of regression weights for THE elements TC, HQ, DM, MT, CN, are all of a statistical significance of 5%. However, LT’s regression weight of more than 10% does not meet the requirement. Thus, the SEM model analysis revealed that there are factors such as organization, technology and an external environment that impact green innovation of Vietnamese enterprises in the digital environment. These factors are statistically significant at 95% reliability. The regressive weights of the above table all bear positive marks that show the organization, technology and external environment concepts, and co-dimensional influence on green innovation at Vietnamese enterprises. In addition, green innovation impacts competitive advantage and performance within Vietnamese firms. These elements in the model explain 59 percent of the variation in variables that depend on green innovation, competitive advantage, and performance at Vietnamese businesses in the digital environment.

Table 5. Regression Weights

		Estimate	S.E.	C.R.	P	Label
DM	<--- TC	,496	,078	1,273	***	
DM	<--- MT	,450	,127	3,547	***	
DM	<--- CN	,216	,056	3,723	***	
LT.	<--- DM	,404	,081	5,017	***	
HQ	<--- DM	,389	,086	4,523	***	
HQ	<--- LT.	,365	,083	4,629	,203	

Source: Summary of results from SPSS 26 and Amos 24



The first SEM model analysis showed that the value of the chi-squared index = 550,532 for P =,000. The other indicator is: Chi-square/DF = 2.753, GFI, TLI are all higher than 0.9 (Bentler & Bonett, 1980), RMSEA = 0.058 < 0.08 (Steiger, 1998) has a set set of conditions: E1 - E5, E2 - E3, E2 - E5, E11 - E12, E11 - E15, E14 - E16, E15 - E17, E15 - E17. The final CFA result of the scale model was shown in FIG 4.2. This model has 270 degrees of freedom. Figure 3 shows the value of the chi-squared indices = 436,635 for p =,000. The other quackage: Chi-square-Df = 2,298, GFI, TLI, CFI are all 0.9 (Bentler & Bonett, 1980), RMSEA = 0.050 < 0.08 (Steiger, 1998), which inferred to be a model that would be consistent with market data.

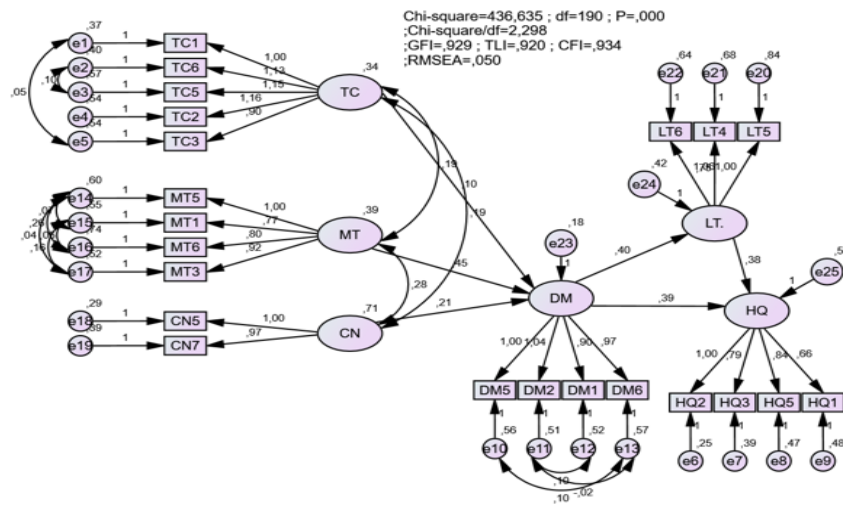


Figure 3. Results of analysis of Linear structure model SEM (Normalized)

Source: Summary of results from SPSS analysis and Amos 22

The study found that 5/6 of the initial hypothesis was accepted and that factors such as the most influential organization, the second and final external environment were the technological factors. The normalized SEM model is shown below (figure 3). The linear regression equation for factors affecting green innovation at Vietnamese enterprises in the digital environment is as follows:

$$DM = 0,496.TC + 0,450. MT+ 0,216. CN$$

4.6. Test Model using Bootstrap Analysis

Schumacker & Lomax (2010) stated: “To evaluate the reliability of estimates, in quantitative sampling methods we would typically divide the sample as two subtypes. Another way is to repeat the study with a different sample. Both of these approaches are often impractical because the structural method often requires large samples, so it is time - and - cost.” In such cases Bootstrap is the appropriate alternative (Schumacker & Lomax, 2010) for the original n = 625 sample, the Bootstrap is an alternative method for repeated sampling, with the initial crowdcasting of 1000 and more.

Table 6. Testing Bootstrap

Parameter	SE	SE-SE	Mean	Bias	SE-Bias	CR
DM <--- TC	0,116	0,006	0,103	0,004	0,008	0,500
DM <--- MT	0,177	0,009	0,476	0,015	0,012	1,250
DM <--- CN	0,081	0,004	0,2	-0,010	0,006	-1,667
LT. <--- DM	0,143	0,007	0,424	0,020	0,015	1,333
HQ <--- DM	0,172	0,009	0,428	0,009	0,012	0,750
HQ <--- LT.	0,107	0,005	0,367	-0,007	0,008	-0,875

Source: Summary of results from SPSS 26 and Amos 22

As such, the table shows: “The Estimate is normal with the method of maximum trends in ML the remaining columns being calculated from the Bootstrap method. The Mean column gives an average of Bootstrap estimations. Bias (deviation) is equal to the Mean column minus Estimate column. Composite reliability columns self - Excel by sharing the LATTER - Bias column by the SE - Bias column. In view of the above table, it is found that the absolute rule of CR is small compared to 2, so it can be said that the deviation is very small, not statistically significant, to 95% confidence “=> Estimates in the SEM model are reliable.

## **5. DISCUSS THE FINDINGS AND SUGGEST A NUMBER OF SOLUTIONS**

From the linear regression equation represents the relationship of factor affecting green innovation, competitive advantage, operational efficiency, at Vietnamese businesses in the digital environment. Among other factors, the most powerful organizational factor is 0.496, followed by an external environmental factor of 0.450 and technology factor of 0.216. H1, H2, H3, H4, H5 are all accepted and H6 is rejected. This result is consistent with the study by some authors that externality, environment, and technology (Lai et al., 2003; Wen and Chen, 1997, Chen 2008 and Chen et al. 2006, Pham Anh Nguyen, 2022. In addition, green reform impacts on competitive advantage, operating efficiency at Vietnamese enterprises. Indeed, Vietnamese enterprises in the digital environment are taking green innovation seriously at Vietnamese enterprises. This is evidence that promoting green innovation, competitive advantage and operational efficiency at Vietnamese enterprises has helped their human resources “shift from volume to substance” in the development of digital economy and sustainable development in the new context. As a result of quantitative research and data research collected, some of the key implications for enhancing green innovation are:

### **5.1. Organizational solutions**

For businesses that innovate green in the digital environment are replicated and diversified in many different fields such as: innovating green business models, developing green business strategies, innovating green products, using resources efficiently and producing cleaner, Greening supply chains, greening logistics systems, green procurement, building green brands... Therefore, in order to effectively promote green innovation in Vietnamese enterprises, it is necessary to: Strengthening financial capacity, human resources as well as green innovation is a basic and vital requirement for the development of enterprises; Focus on renovating organizational management for sustainable development; Promote corporate culture, business ethics, social responsibility. Along with that is green innovation on the basis of advanced technology, creating a core factor for competition and sustainable development.

In order to effectively innovate green in the digital environment, Vietnamese enterprises need to implement digital transformation in human resource management according to the innovation competency framework including 7 groups of competencies: (i) Improving the efficiency of equipment and software operation with the operation of digital equipment, operate digital software and services; (ii) Optimizing information and data extraction with identification of information needs, information search, information evaluation, management of information storage and use; (iii) Innovate communication and cooperation in the digital environment with communication of behavioral norms, understanding the public, effective community participation, exercising rights and services through digital platforms, behaving in the network environment in accordance with ethical and legal standards; (iv) Improve digital safety and wellbeing with digital footprint control, digital identity and privacy protection, digital security maintenance, and environmental protection; (v) Green innovation with innovative thinking practices in the digital environment, creating digital content, applying legal foundations in building and developing digital content, participating in the process of building and developing applications on digital platforms; (vi) Innovating ways to practice and develop digital skills,

recognizing trends and opportunities of online training, digital learning, however open to learning resources; (vii) Solutions to use digital competencies for careers with the use of digital technology for specific jobs, identification and evaluation of specific content and data, use of technology in green innovation.

### **5.2. Solutions for the external environment**

To affirm the importance of green growth in national sustainable development, on the eve of COP 26, the Prime Minister approved the “National Strategy on Green Growth in the period of 2021-2030, vision to 2050” in Decision No. 1658/QĐ-TTg, dated October 1, 2021, in which, setting out the goal of promoting economic restructuring associated with renovating the growth model, to achieve economic prosperity, environmental sustainability and social justice; towards a green economy. The Government has specific priority policies: “Enterprises develop human resources and green jobs, Vietnam encourages the development of human resources for green industries, creating green jobs; attach importance to training and fostering knowledge, skills in governance and administration in the green economy, green production and green innovation for public administrators and enterprises, especially focusing on leaders, managers and policy-makers”

According to CIEM (2020): “The Government needs to create policies to adjust social security and train green human resources to apply AI education technology and information technology infrastructure, develop action plans for internet development combined with artificial intelligence; launching Vietnam’s green innovation strategy with Industry 4.0, digital economy in which people are used as the core. With the main directions are Big Data technology, network system platforms, artificial intelligence and conducting research investment in key scientific projects, universities and research centers work closely with businesses to put green innovation projects into practical application”.

### **5.3. Technology solutions**

Enterprises focus on regularly organizing short-term training programs on green innovation in general as well as digital transformation, digital skills to promote green innovation for the workforce in their businesses, specifically:

Leaders need to attach: “Training digital transformation knowledge, digital skills to promote green innovation in businesses, including management contents in the digital age, accessing digital markets and digital customers, analyzing data to make appropriate decisions and calculating green products, Green services meet customer needs, organize production activities, provide services, optimize costs, manage smart finance, manage customer care continuously, maintain commitment, improve the quality of products and services, expand markets to promote green innovation”.

Target technical staff: Training on digital transformation, digital skills to promote green innovation in enterprises, steps to implement digital transformation. Digital technology (AI, Blockchain, BigData, Cloud Computing Service) how to apply, and governance in enterprises promotes green innovation.

Workers need to focus: “Information and data literacy promotes green innovation; Digital communication and communication skills promote green innovation; Skills in creating digital content/products that promote green innovation; Skills in data protection in the digital environment to promote green innovation; Skills in handling situations, how to fix them, and finding help in cyberspace promotes green innovation.”

### **5.4. Promote green innovation capacity in the use of AI and cloud computing to enhance competitive advantage and operational efficiency**

Artificial Intelligence (AI): Ministry of Science and Technology (2020) said that “Businesses need to promote green innovation by harnessing the power of AI artificial intelligence to process and analyze this huge volume of data to extract actionable insights and provide a better customer experience, improve

operations and increase revenue through new products and services, increasing the competitive advantage of businesses.” Thus, AI with the ability to help manage, optimize and maintain at the same time infrastructure and customer support activities, applying artificial intelligence to promote green innovation in enterprises.

Cloud computing and cybersecurity need to be taken seriously: “Promoting green innovation to improve internal efficiency, cloud computing technology enables the transition from a product-based model to a service-based model. The software-based service model can apply the features of existing Vietnamese enterprise infrastructure, to manage transactions and services, bringing significant benefits in terms of flexibility, delivery time, and reduced operating costs.” From here, Vietnamese enterprises also need to promote green innovation in terms of security and security.

## 6. CONCLUSIONS

The research results show that the factors affecting green innovation in Vietnamese enterprises in the digital environment are technology, organizations and the environment. In which the organizational factor has the strongest impact. In addition, green innovation also affects competitive advantages and operational efficiency in Vietnamese enterprises. At the same time, the study also proposes a number of policy implications for managers at Vietnamese enterprises to enhance green innovation to promote competitive advantages and operational efficiency at Vietnamese enterprises in the digital environment. However, historical research.

Using data from 625 questionnaires from Vietnamese enterprises, the survey of the study sample has not really been covered.

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## STUDY OF FACTORS AFFECTING TOURISTS' SATISFACTION IN SAPA, LAO CAI

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**ABSTRACT:** *This study was conducted to assess the satisfaction of tourists in Sapa, Lao Cai. Based on survey data of 247 tourists, the study model was validated through regression analysis. The results show 4 factors has a positive impact on tourists' satisfaction in Sapa, Lao Cai include: (1) Service prices, (2) sightseeing environment, (3) Natural attractiveness, (4) Destination accessibility. In which, the factor considered by customers to have the strongest impact is destination accessibility. The results of this study contribute to helping managers and businesses understand the factors affecting tourists' satisfaction in Sapa, Lao Cai. From there, the research team gives suggestions to help tourism businesses improve business efficiency in tourist destinations Sa Pa, Lao Cai in the near future.*

**Key words:** *factors affecting; tourists' satisfaction; Sapa, Lao Cai.*

### 1. INTRODUCTION

The tourism industry plays an increasingly important role in creating positive changes for Vietnam's economic, social, cultural and international integration development. In recent years, Northwest tourism has developed strongly, attracting tourists with many different types of tourism. With the advantage of close proximity to the border, diverse national culture, as a key locality of Lao Cai tourism, Sapa has emerged as an ideal land for those who are passionate about exploring and relaxing tourism, this place attracts millions of tourists every year. In order to promote the development of the tourism industry as well as attract more visitors to Sapa as well as Vietnam's tourist resorts, it is important to focus on improving tourist satisfaction.

Sapa is a highland district of Lao Cai province. This place with abundant natural resources, both majestic and dreamy, cool climate all year round, diverse unique culture of ethnic minorities in the Northwest. Sapa has become one of the world's leading destinations, attracting a large amount to the domestic and international tourist market. According to statistics of the Vietnam National Administration of Tourism, the number of tourists to Sapa is constantly increasing after the Hanoi - Lao Cai expressway system and Sun Group's Fansipan cable car project came into operation from the end of 2015.

However, after two years of the impact of the Covid-19 pandemic, tourism was restored, Sapa welcomed a large number of tourists back, leading to many overcrowding conditions, insufficient conditions of facilities compared to the current situation. Along with that, the quality of service has decreased, the professionalism is not high, it does not meet the needs and desires of tourists, the general intangible reduces the satisfaction of tourists with the destination, the rate of tourists returning decreases. The restrictions manifest themselves in the types of tourism in tourist areas such as accommodation, dining, sightseeing and relaxation.

The satisfaction of tourists with a destination is always a topic that receives a lot of attention from researchers not only in Vietnam but also in the world. In terms of aspects of satisfaction, there are three related issues that are mentioned and the most studied are studies on service quality; research on the overall level of tourists' satisfaction; research on tourists' satisfaction at a destination.

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The famous study by Thuy Huong Truong and Brian King (2009) “An evaluation of satisfaction levels among Chinese tourists in Vietnam” (2009) was also explored by the research team. What is new about the study is that there is a comparison to assess the importance of different destination attributes to traveler satisfaction. The authors also found that travelers’ perceptions of destination behaviors supported predictions of satisfaction of loyalty to a destination.

At the same research site, authors Bui Thi Thanh Huong and Lorna T. Grande (2022) also conducted a study on Sa Pa, Lao Cai with the topic “Tourists’ Satisfaction and Behavioral Intention in Eco-Tourism Sites of Sa Pa (Lao Cai Province)”. The study is mainly conducted on ecotourism here, although the study has clearly identified the factors affecting Sapa ecotourism and their behavioral intention to travel to eco-tourism destinations of Sapa for the Year 2020. The study recommended the following policy recommendations to improve the service of Eco tourism destinations in Sapa about Ecosystem health and cultural attraction; Amenities; Accommodation, food, people, safe and security and some other policy recommendations.

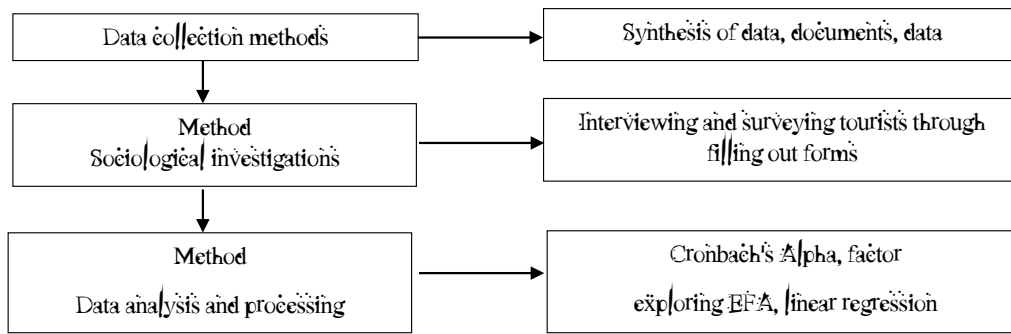
For the study in the Northwest region, author Nguyen Cong Vien in his research pointed out that the quality factors of community tourism destinations affecting the satisfaction of community tourists are: sightseeing environment, infrastructure, price, indigenous culture, natural attraction. While the magnitude of the impact factors varied, they were all positive and statistically significant factors for this study. Sapa is also one of the locations in the Northwest, so the elements of the research by author Nguyen Cong Vien are absolutely necessary for the research topic of the group.

Another study with a specific study location is Ta Xua, Ta Xua commune, Bac Yen district, Son La province, the research team built from the models of John et al. (1998), Pizam et al. (1978), and Hoang Trong Tuan (2015) and adjusted into 5 elements (according to Sharron 1997’s view): (1) accessibility; (2) the attractiveness of tourism resources; (3) amenities; (4) accommodation; (5) attitude (awareness); (6) Safety. The authors found that there are two factors in which visitors are not satisfied, making the satisfaction of tourists with the destination low. Considering that the factors are of great importance, but in terms of the “Security and safety” factor in practice, the research team learns through the actual situation that the level of safety in Sa Pa, Lao Cai is always guaranteed in the best way. Local authorities always coordinate with mass departments to proactively come up with drastic solutions to ensure security, safety, friendly and hospitable people in Sapa, so this factor can be removed from the research topic.

An overview of national and international studies, studies with different approaches and the application of different methods to understand the factors affecting tourist satisfaction. Many works compare the importance of attributes of destinations with tourists’ satisfaction to create novelty for research. However, previous studies have only been conducted on ecotourism examples and have not really comprehensively assessed the satisfaction of tourists in Sa Pa, Lao Cai. For tourism businesses in Sa Pa, there should be a study to show the influence of factors on tourist satisfaction. And through that, this study makes suggestions to better exploit factors to improve tourist satisfaction in the next time.

## **2. METHODOLOGY**

Quantitative research methods are used to validate research scales and models. The scales are evaluated through the following tools: Cronbach’s Alpha confidence coefficient test; exploratory factor analysis (EFA) and descriptive statistics, regression analysis.



**Fig.1: Research process**

In terms of sample size, the concept of “representativeness” or “sample size” is based on a minimum sample size ratio of 5:1. According to Hair & ctg (2006), the minimum sample size is 50, the ratio of observations/items is 5:1, meaning that a measurement variable needs a minimum of 5 observations, preferably a ratio of 10:1 or more. The scale of this study has 21 variables, so the minimum number of observations (votes answered) is  $21 \times 5 = 105$  observations. However, with a scientific topic, to ensure more objectivity and accuracy, the research team issued 260 questionnaires. In particular, the research team distributed 210 vouchers for domestic tourists and 50 vouchers for international tourists. The reason why the research team collected mainly domestic tourists and only 1 part of international tourists is because Sapa is mainly a domestic tourist destination, so it attracts many domestic tourists. Moreover, this is a topic of student scientific research, the ability of the research team is limited, so it is natural to mainly choose domestic tourists. If more international visitors are collected, it may bring many difficulties and inadequacies to the research team.

The research team sent Google Forms links to tourists who have come to Sapa through communication channels, groups on Facebook forums, Tik Tok. Travelers respond to the survey by filling out the information directly on Google Forms. With the secondary data, the team used meta-analysis and systems analysis methods.

### 3. RATIONALE

#### 3.1. The concept of satisfaction and tourists’ satisfaction with a destination

There are many concepts of satisfaction, each researcher has different concepts and definitions. According to Kotler (2001), “Customer satisfaction is the degree to which a person’s sensory state stems from comparing the results obtained from the consumption of the product/service and the expectations of the customer.” As authors Yang & Peterson (2004) and Chen & Tsai (2008) once mentioned, customer satisfaction is a concept that measures all levels of satisfaction that customer has with the organization providing the service after all interactions and interactions with the customer.

After all, according to research and inherited from previous studies, the research team thinks that satisfaction is an internal emotional state, determined on the basis of customers’ objective assessment of the realities of experience compared to their expectations when using the service, The better the quality of the experience, the more satisfaction is valued.

Tourists’ satisfaction is the difference between the expected and perceived value that tourism products have impacted on a traveler’s emotional state (Yoon & Uysal, 2005). Chen and Tsai (2007) affirm tourists’ satisfaction as the positive perception or feeling that travelers have when engaging in leisure and leisure activities and is indicated by the level of enjoyment from those experiences.

From the above-mentioned concepts, the team approaches the concept of tourists’ satisfaction as the perceived value of tourist expressed by the level of satisfaction gained when participating in tourism activities organized in the destination.



### 3.2. The relationship between destination quality and tourists' satisfaction

Tourists participating in tourism activities often have the opportunity to have access to many different services in a destination and therefore it is quite complicated to assess the perception of the quality of service (Marcjanna Augustyn, Samuel K. Ho, 1998). Therefore, researchers often use the concept of "Destination Quality" to indicate the attributes of services introduced by service providers in a locality, namely: The quality of roads, airports, ports, hotels, restaurants, bars, communication systems, etc parks, amusement parks, sports activities, museums, historical sites, safety levels, political stability, commodity prices, air environment, weather, noise pollution, traffic congestion. Meanwhile, when researching tourism in mountainous provinces, in addition to the destination service quality components mentioned above, factors belonging to mountainous tourism resources also play a very important role in creating destination attractions and attracting tourists back.

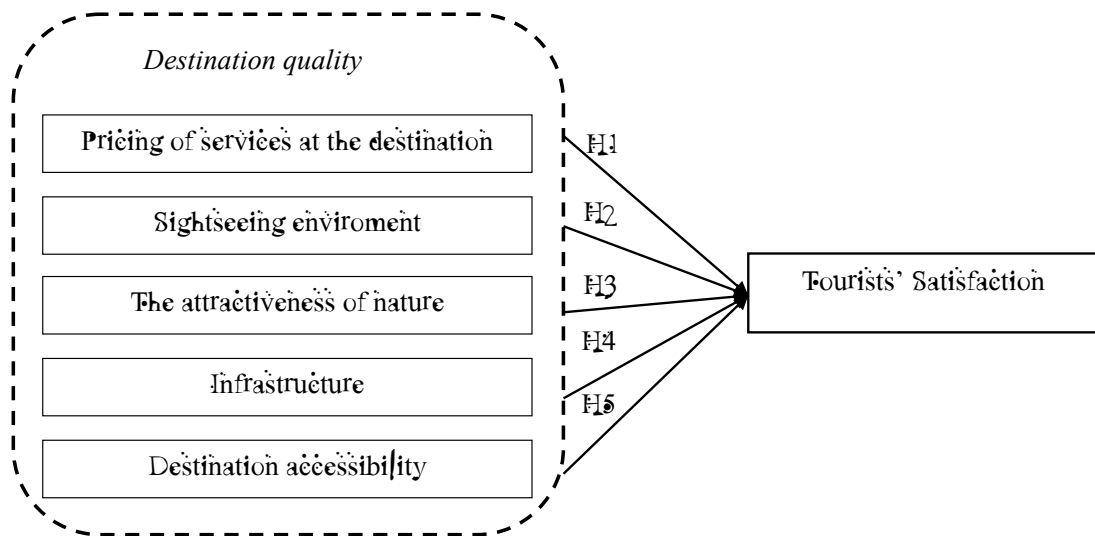
The study by Baker et al. (2000) looked at the correlation between destination quality and visitor satisfaction in the context of visitors participating in festivals. The authors' analysis indicates that perceived quality has a strong impact on visitor satisfaction. However, most studies only approach the concept of the general perceived quality of travelers towards destinations without examining the various components of destination quality and visitor satisfaction. The study by Lee et al. (2004) explores the relationships between service quality and satisfaction, and their effects on behavioral loyalty among primary forest visitors. They found that service quality is a direct influence on satisfaction and that satisfaction plays an intermediary role between service quality and behavioral intent. Furthermore, quality of service was also found to have a direct effect on behavioral loyalty. Thus, the authors concluded that the impact of quality of service on behavioral intent is as important as the impact of satisfaction on behavioral intent. In addition, several other studies in the field of tourism have shown that traveler satisfaction is measured by their perception of the components of destination quality (Dwayne A. Baker, John L. Crompton, 2000). In addition, destination quality plays an important role in behavioral decisions including: influencing the decision-making process of destination selection, post-travel decision-making, and future behavioral intentions; such as return intent and word-of-mouth intent (Bigne and Sanchez, 2001; Chen and Tsai, 2007; Lee 2005).

Travelers' destination quality assessments can be considered primarily based on trip quality perceptions through comparisons between expectations and performance (Chen and Tsai, 2007). However, the influence of destination quality on behavioral decisions has been neglected in previous studies, with the exception of the study of Bigne et al. (2001) and Lee et al. (2005). From a marketing point of view, Lee et al. (2005) argue that individuals who rate a destination well are more satisfied and therefore share their positive experiences on websites, expressing their intention to visit again. Research into the effect of different components of destination quality on visitor satisfaction remains limited and debated. Specifically, previous studies have identified perceived quality as well as destination quality as a general concept and have a direct impact on visitor satisfaction (Crompton and Love, 1995). Meanwhile, other studies have looked at quality through a variety of components, using the SERVQUAL (Tangible, Reliable, Responsive, Reassuring, and Empathetic) service quality scale proposed by Parasuraman et al. (1988) and developed in 1991. 1993 for evaluation. For example, Bojanic and Rosen (1994) used the SERVQUAL scale in restaurant service research; Saleh and Ryan (1992) studied lodging services; Pizam et al. (2004) studied travel services in a destination (Chi and Qu, 2008). In particular, the research of Chi et al. (2008) has approached different components of destination quality such as: (1) Visiting environment; (2) The attractiveness of nature; (3) Recreational and recreational activities; (4) The attractiveness of historical sites; (5) Infrastructure; (6) Convenience in the transportation system; (7) Relaxation services; (8) Outdoor activities; (9) Quality of accommodation and

food services. However, the author considers them to be component indicators of destination quality and impact on satisfaction and loyalty without considering them as standalone components. Finally, the above studies approach the context of western culture where the development of tourism services is too modern and overexploitation of natural resources and resources for tourism development (Truong and King, 2009). While the problem in the development of Vietnam’s mountainous tourism is the close connection between development and preservation and preservation of indigenous cultural values. The question is how do you assess the effects of destination quality on visitor satisfaction? Which of the components constituting the quality of mountain tourism destinations (e.g., accommodation, catering, tours; entertainment services; shopping services; attractiveness of mountain tourism resources; indigenous culture; transportation; local people...) needs to be invested in exploitation or needs to be preserved is a matter of concern heart? Therefore, conducting research to verify whether different components of destination quality have an impact on traveler satisfaction is essential.

**3.3. Research framework and Hypothesis development**

From the previous research model and characteristics of Lao Cai tourism, the authors proposed the research model as shown below:



**Fig.2: Research framework and Hypothesis development**

Based on the research model, the team focused on the influence of factors (Fig.2) on tourists’ satisfaction in tourist areas in Sa Pa, Lao Cai. The elements in the research model are presented as follows:

Service prices: The price of travel services or the price of services at the destination is all the costs that tourists have to pay during the journey: travel costs, accommodation, accommodation, tour guide costs,... and some other expenses. Tourists will be satisfied with the tourist destination if and only if the price of services or costs that tourists spend will be commensurate with the quality of services that tourists experience. Therefore, the research team proposes this factor into the research model of the topic.

Sightseeing environment: Sightseeing environment or tourist environment is an environment consisting of natural, socio-economic and human factors, including the existence and development of tourism activities. Nguyen Trong Nhan (2013) said that “The tourist sightseeing environment is an environment that includes natural, socio-economic and human factors, including the existence and development of tourism activities”. He emphasized that tourism has a close relationship with the sightseeing environment at the tourist destination. The characteristics and elements of the sightseeing environment are optimally utilized, serving tourism

activities such as attracting tourists and developing the tourism economy in that destination. On the contrary, tourism activities also contribute to the reciprocal impact on the visiting environment, changing more or less the existing characteristics of the environment. Tourism activities that have a close relationship with the environment, the impact of the tourism environment or the impact of the “Sightseeing environment” factor are considered factors that have a direct impact on the satisfaction of tourists in Sa Pa, Lao Cai. Therefore, The research team proposed the element of “Visiting Environment” into the research model of the project.

Natural attractiveness: Tourism resources or all things natural and cultural values created by man. The richer, more diverse, spectacular and especially unique and strange tourism resources are, the more attractive it is to tourists, which also positively impacts the satisfaction of visitors. Rittichainuwat and Mongknonvanit (2002), “Natural attractiveness is one of the important factors for evaluating tourism resources and building the image of tourist destinations”. The team also said that the attractiveness of nature is the attraction between nature in the tourist destination for tourists. This attraction includes: the suitability of natural resources for tourism activities; material and technical foundations for tourism; capacity; the development of various types of services for tourists in tourist destinations; the diversity and uniqueness of resources for organizing various types of tourism. On the basis of inheriting previous researches, in order to improve the satisfaction of tourists in tourist destinations, the research team proceeded to propose the factor “Attractiveness of nature” into the research model of this research topic.

Infrastructure: These are facilities and technical facilities to meet the needs of not only tourists but also local people. In order to ensure tourism development in general and ensure the satisfaction of tourists in particular, the element of tourism material and technical infrastructure or the element of tourism infrastructure - “Infrastructure” needs to be invested and facilitated for development. According to Bui Thanh Thuy (2010), “Tourism infrastructure systems consist of many components, they have certain functions and implications for creating and satisfying tourists. In order to improve the quality of destinations, tourist attractions need to build corresponding tourism infrastructure such as hotels, restaurants, canteens, shops, petrol supply stations, health stations, sports venues ...”

Destination accessibility: Pham Hong Long, Phan Thi Quynh (2020) mentioned accessibility which is the level of ease and convenience to reach the destination through the transportation system, different means of transportation. Or it can be roughly understood that a tourist destination must be convenient for visitors to access by many types of transportation. It is the level of ease and convenience that tourists can reach the destination through the transportation system, various means of transportation,... No matter how attractive and attractive a destination is, but the problem of accessing the destination is still difficult, tourism activities will not be exploited and developed in the best way. The development of “destination accessibility” contributes to improving tourists’ satisfaction with the tourist destination. Therefore, the research team proceeded to propose the “Destination Accessibility” factor into the research topic.

Based on the theoretical overview and research model, the hypotheses proposed are as follows:

Hypothesis H1: Service prices have the same impact as tourists’ satisfaction in Sa Pa, Lao Cai.

Authors Muchapondwa & Pimhidzai (2011), Pham Hong Manh (2009), Croes (2000), Uysal & Crompton (1984), Loeb (1982), Stronge & Redman (1982) and Archer (1980) identify cost factors that affect travel demand. So, the more reasonable the cost, the more demand for tourism increases, thereby creating the satisfaction of tourists for the destination. (Tosun and Timothy, 2013).

Hypothesis H2: The sightseeing environment has the same impact on tourists’ satisfaction in Sa Pa, Lao Cai.

The authors Bui Thi Hai Yen (2010), Nguyen Trong Nhan (2013) all commented on the sightseeing environment with a close relationship with tourism activities. Tourism activities have an impact that changes the characteristics of the environment, and the more attractive the visiting environment, the more satisfaction will be created for tourists by increasing the quality of the destination.

Hypothesis H3: The attractiveness of nature has the same effect as tourists' satisfaction in Sa Pa, Lao Cai.

The richer, more diverse, spectacular and especially unique and strange tourism resources are, the more attractive it is to tourists, which also positively impacts the satisfaction of visitors (Pham Hong Long, Phan Thi Quynh, 2022). In research, the attractiveness of nature includes landscapes, landscapes, biodiversity,...

Hypothesis H4: Infrastructure has the same impact on tourists' satisfaction in Sa Pa, Lao Cai.

Infrastructure has always been important in the development of the national economy as well as the development and improvement of service quality. The infrastructure element meets the needs of tourists, the satisfaction of tourists will be enhanced. "In order to ensure the improvement of destination quality, tourist attraction needs to build corresponding tourism infrastructure such as hotels, restaurants, canteens, shops, petrol supply stations, health stations, sports venues ..." (Bui Thanh Thuy, 2022).

Hypothesis H5: Destination accessibility has the same effect as tourists' satisfaction in Sa Pa, Lao Cai.

A highly rated travel destination not only stops at the above factors, but it is also judged through the accessibility of a destination. If visitors have difficult access to tourist destinations, of course, the level of satisfaction of visitors will be affected. Accessibility is of particular importance to the decision on point selection come because it affects the time, distance, and cost of the trip (Chi and Qu, 2008)

## **4. RESULTS AND DISCUSSION**

### **4.1. Results of analysis of research models**

#### **4.1.1. Sample descriptive statistics**

In terms of age, visitors aged 18 to 25 accounted for the largest proportion with 58.7%; the age group from 26 to 45 years accounted for 34.8%; Under 18 accounted for only 1.2%.

In terms of gender, there were 122 fill-in ballots for female respondents and male respondents for 50.6%.

In terms of income, the majority of tourists here have quite high incomes, specifically visitors with incomes from 10 million to less than 20 million accounting for the majority with 37.2%, followed by tourists with incomes below 10 million at 30.4%, from 20 million to 30 million accounting for 18.6%, the rest visitors with incomes over 30 million.

Regarding the number of times that tourists have been to Sapa, it can be said that the demand to return to Sapa is relatively large. Because through the survey, up to 37.7% of tourists have been to Sapa 2 times, 9.7% of tourists have traveled 3 times, and 8.1% of tourists have been to Sapa more than 3 times.

#### **4.1.2. Results and dicusion**

The scale is assessed for reliability using Cronbach's Alpha coefficient. The results of the scale's reliability assessment show that most Cronbach's Alpha values are greater than the required value of 0.65 (table 1). Cronbach's Alpha values if the variable type are all lower than Cronbach's Alpha values. The total variable correlation values are all greater than 0.3. Therefore, the scales used are highly reliable.

**Table 1: Cronbach's Alpha Coefficient**

Factor	Number of observed variables	Cronbach's Alpha
Service prices (PRI)	5	0.748
Sightseeing environment (ENV)	4	0.844
The attractiveness of nature (ATT)	4	0.774
Infrastructure (INF)	4	0.833
Destination accessibility (ACC)	4	0.724
Tourists' satisfaction (TS)	3	0.730
Sum	24	

Next, the research team conducted EFA factor analysis. The EFA results obtained 24 observed variables that measure the extraction into 05 independent variables and 01 dependent variable, which were extracted into 06 factors as suggested by the research model with Initial Eigenvalues greater than 1. Total method The explanation error when taking the factor group is 64.934% (> 50%). Five independent variables all have the same independent factor load observation variables corresponding to the required Factor Loading value greater than 0.3.

The results of the quantitative analysis showed that corrected<sup>R2</sup> = 0.5224 and corrected R2 = 0.514 meant that 51.4% of the variation in traveler satisfaction was explained by independent variables in the study framework. In addition, the results of ANOVA variance analysis show a value of F = 66.086; the value Sig. = 0.000 (< 0.05) represents a correlation between independent variables and dependent variables that ensure reliability. As such, the research model fits the dataset and is usable. Regression coefficient result for the Sig. value of the independent variable Service Price at the destination; Visiting environment; The attractiveness of nature; Destination accessibility is equally equal to 0.000 (< 0.05). This represents variables that have an impact on Traveler Satisfaction for Sa Pa, Lao Cai. Reliability, Pricing of services at the destination; Visiting environment; The attractiveness of nature; Destination accessibility positively impacted Satisfaction (Betas received positive values of 0.283; 0.092; 0.268; 0.339, respectively). The regression equation was determined as follow:  $TS = 0.253 + 0.283 PRI + 0.092 ENV + 0.268 ATT + 0.339 ACC$

Thus, the results of multivariate regression analysis show that, of the 5 factors included in the analysis model, 4/5 factors have a positive impact on the satisfaction of tourists in Sa Pa, Lao Cai. Thus, according to the results of testing the research model, there are sufficient grounds to support the hypothesis H1, H2, H3, H5.

**Table 2: Conclusion about the research hypothesis**

Hypothesis	Content	Result Accreditation
H1	Hypothesis H1: Service prices have the same impact as the satisfaction of tourists in Sa Pa, Lao Cai	Accept
H2	Hypothesis H2: The sightseeing environment has the same impact on the satisfaction of tourists in Sa Pa, Lao Cai	Accept
H3	Hypothesis H3: The attractiveness of nature has the same impact on the satisfaction of tourists in Sa Pa, Lao Cai	Accept
H4	Hypothesis H4: Infrastructure has the same impact on Tourists' satisfaction in Sa Pa, Lao Cai	Not accepted (Due to variable type)
H5	Hypothesis H5: Destination accessibility has the same impact on Tourists' satisfaction in Sa Pa, Lao Cai	Accept

With the obtained linear regression model, it can be concluded that:

The factor that has the strongest impact on tourist satisfaction is the accessibility to the destination (0.339). The main reason is that recently the transportation system has been improved, tourists can easily access the tourist destination Sapa.

The next factor is the price of the destination with a beta of 0.283. Because in recent times, the price management of this destination is quite good. Service providers shall publicize their prices and have pricing methods suitable to the quality of services provided.

The attractiveness of nature is also one of the factors considered to have a large influence, with a beta coefficient of 0.268. Although it is one of the tourist destinations exploited early, it can be said that SaPa is still an attractive destination in terms of nature.

The sightseeing environment has the smallest impact on tourists' satisfaction with a beta coefficient of 0.092. Thus, this is a factor that has been accepted by tourists and does not change the satisfaction of Sapa tourists.

On the other hand, descriptive statistics the observed variables, the research team obtained the following results in table 3. Through the above summary table, it can be seen that visitors have different feelings, but most of the satisfaction of tourists is rated at a fairly high level. Travelers in Sa Pa, Lao Cai are most satisfied with the factor "Attractiveness of nature" (average score of 4.31 on the Likert scale of 5 points), satisfaction with "Destination accessibility" at a relatively high score of 4.04 points, followed by "Sightseeing environment" with 3.92 points and "service prices" with 3.91. Tourists' satisfaction was lowest in terms of "Infrastructure" with 3,87 points. The results of the descriptive analysis are a good sign for the tourism business units in Sa Pa, because the major influencing factors are being highly appreciated by tourists.

**Table 3: Descriptive statistics on the level of tourists' satisfaction with the factors of the destination Sa Pa, Lao Cai**

Variables	N	Lowest	Highest	Average
Service prices	247	1	5	3.91
Sightseeing environment	247	1	5	3.92
The attractiveness of nature	247	1	5	4.31
Infrastructure	247	1	5	3.87
Destination accessibility	247	1	5	4.04
Tourists' Satisfaction	247	1	5	4.10

In summary, the factor accessibility to the destination has the strongest impact of the four factors included in the model of visitor satisfaction analysis in Sa Pa, Lao Cai; Next is the service price factor; The attraction of nature is the third influencing factor and the sightseeing environment has the least impact on visitor satisfaction in Sa Pa, Lao Cai. The study has not assessed the impact of infrastructure factors on tourist satisfaction. Therefore, in order to improve tourist satisfaction, the study will give some suggestions to improve the factors that have a stronger influence on tourists.

## 5. SOME SUGGESTION

The results of the study show that travelers are still not really satisfied with some of the factors surveyed. Based on the above research results, the research team made some suggestions to improve the satisfaction level of tourists in Sapa, Lao Cai.

### 5.1. Flexibility in pricing and adjusting service prices at the destination

It can be seen that in emerging tourist destinations recently, the situation of increasing prices, arbitrarily raising selling prices is always a painful problem, causing disfavor for tourists, reducing the level of satisfaction of tourists. Therefore, in order to increase the satisfaction of tourists in Sapa, tourism businesses need to have directions to set reasonable prices. Price must go hand in hand with quality, and at the same time must be commensurate with the quality of service that tourists experience.

When there are incentives and promotions, tourism businesses can use the media to promote to attract tourists and improve revenue. Ministries and departments must regularly cooperate with local authorities to strictly handle violations of arbitrarily raising and inflating commodity prices to attract customers. Thereby creating a service space for guests, increasing visitor satisfaction.

### **5.2. Create a friendly destination environment**

In order for Sapa to become an attractive destination for tourists, it is essential to bring a green, clean and beautiful environment. Limiting the use of materials that can cause pollution and disposing of garbage in the right places are the leading solutions to this problem. Develop investment projects for the protection, preservation and development of diverse cultural traditions of ethnic minority communities, because this is the strength of Sa Pa.

It is necessary to coordinate with local authorities and construction management agencies to strictly control new construction projects, ensure they do not disrupt the environmental landscape and have adequate water and waste treatment options in accordance with environmental protection standards. Travel businesses need to understand and take responsibility for training guides as pioneers in environmental culture protection. For local communities: organize propaganda widely through mass media, talks, panels, posters, posters to promote people to understand that indiscriminate exploitation will lead to depletion of resources, directly affecting the lives of them and their descendants, damaging the long-term ecological environment at the tourist spot, leading to the degradation or even loss of the exploitability of the tourist spot.

### **5.3. Enhance the natural appeal of the destination**

Sapa is facing many problems in maintaining growth along with ensuring sustainable development. However, reality shows that Sapa develops without control, lack of sustainability makes this place gradually lose its inherent natural beauty, there are too many constructions, concrete, plastic waste leading to pollution. The rapid urbanization process makes Sapa is gradually losing ecological balance, the landscape is violated and degraded.

To increase the attractiveness of natural resources, Sapa should differentiate itself from other localities and take advantage of the available tourism potential of the town. It is recommended to add crops that are local specialties in eco-tourism areas for guests participating in the garden. Invest more in quality facilities for roads in Sapa and build a number of medical stations to support visitors when facing difficulties. There should be more plans to improve, refurbish, change and decorate holiday-themed destinations, or seasons of the year, causing excitement, newness, not being boring to attract more guests. Promote the advantages of terraced fields in the current period for socio-economic development, tourism development, strengthening cultural exchange, promoting the image of Vietnam in general and Sapa in particular to international friends.

### **5.4. Enhancing access to Sapa destinations for tourists**

Upgrade the system of roads and means of transport to create convenient and safe travel conditions for tourists. Enhance the application of science and technology, reduce costs and improve efficiency in investment in transport infrastructure construction. Regularly strengthen the quality inspection of the road surface, set convex bridge mirrors, design safety barriers; Build permanent berths and parking lots to encourage private garages to operate more conveniently. It is necessary to arrange more reasonable boards and signboards so that visitors can access the destination more easily and conveniently, avoiding getting lost, wasting time of tourists, affecting the level of satisfaction of tourists at the destination.

## 6. CONCLUSION

In general, the research results have partly shown the relationship between the influencing factors and the satisfaction of tourists in Sa Pa. Visitors' satisfaction about Sapa has contributed to promoting tourism here, creating jobs for redundant laborers in the countryside, contributing to increasing incomes and improving people's lives. However, it must be said that visitor satisfaction in Sa Pa still has some points to improve towards sustainable development in the future.

Within the scope of the research, due to limitations in time, capacity, etc. Therefore, the research only stops at determining the factors affecting the satisfaction of tourists in Sa Pa, Lao Cai. Although the research has been focused on previous documents, the research models are still limited, leading to not showing all the factors affecting tourist satisfaction. Therefore, further studies still need to add more variables in the research model, this is a further research direction of the topic.

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## OPTIMAL FISHERY MANAGEMENT IN VIETNAM UNDER THE IMPACT OF CLIMATE CHANGE

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*ABSTRACT: This study discusses how Vietnam should manage its fisheries in the face of climate change, following the three scenarios which will be discussed further in this document. Scenario 1 is described as the action of maintaining the current harvesting effort (Status Quo). Scenario 2 suggests closing the sea for fishery biomass conservation (Closure). Scenario 3 pursues the maximum economic yield in the Vietnamese fisheries (MEY). The fishery yield function is based on the sea surface temperature affected by global warming, which is expected to rise at an annual rate of 0.01°C, starting from 26.35°C, starting from the base year 2013. The bioeconomic model is used. For the model regression, secondary data for the years 1990 to 2020 were used from Statistic Bureau and World Bank data. The findings indicate that if Vietnam keeps up its current harvesting efforts (scenario 1), global warming and current fishing intensity may eventually cause the Vietnamese fisheries to collapse. In contrast, the stock may rebound if Vietnam outlaws fishing (scenario 2), but no profit will be made in the sector. The MEY (scenario 3) strategy, where both the stock and profit are positive even under the influence of global warming, is the most practical one. The execution of such a program, however, necessitates the integration of climate change mitigation policy because the unforeseen result of MEY is a decline in fish production and profit. Currently, a workable solution to rebuild the fishery ecosystem and maintain economic value can be found in the establishment of various conservation zones for fish recovery in conjunction with ongoing harvesting in the other areas under the transferable quota system and climate change adaptation institutions.*

*Keywords: fishery management, climate change, global warming.*

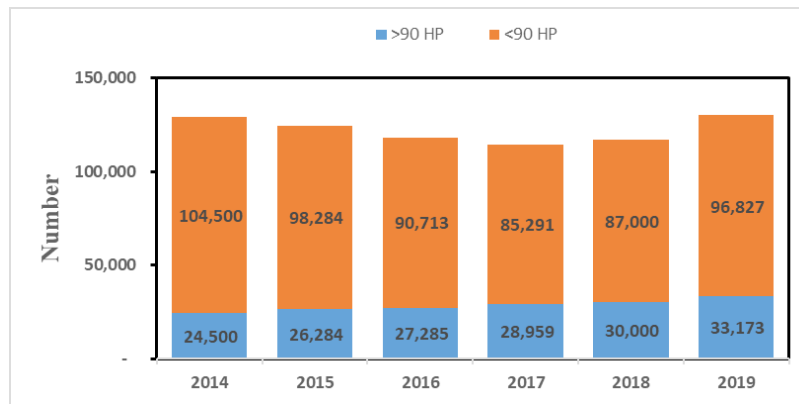
### 1. INTRODUCTION

Vietnam has been recognized as having significant potential for improving fisheries development and the national economy as a coastal country with more than 3260 kilometers of coastline, a number of protected bays, and other profitable natural conditions. The Vietnam Marine Strategy to 2030, with a vision to 2045, asserts that aquaculture and fishing is one of the top priorities with an aim of developing the nation's marine economy (The Central Committee of the Communist Party of Vietnam, 2018)

About 99% of the fishing boats in Viet Nam are small wooden boats, however a small number of steel and composite boats have lately been constructed in accordance with Government Decree No. 67 but comprise only a negligible number. By 2019, the number of fishing vessels was 109,762 vessels, of which 33,173 vessels had capacities of more than 90 HP and 96,827 vessels of less than 90 HP capacity (Figure 1). This indicates that small boats have a propensity to operate close to shore whereas there are very few large capacity vessels operating farther offshore. Typically, coastal fishing involves the overfishing of small, immature, and spawning fish,...easily to encroach on aquatic resources and ineffective, whereas offshore fishing along routes will result in more efficiency.

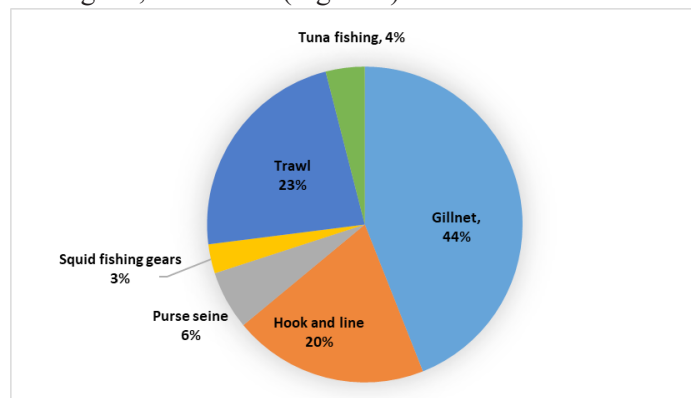
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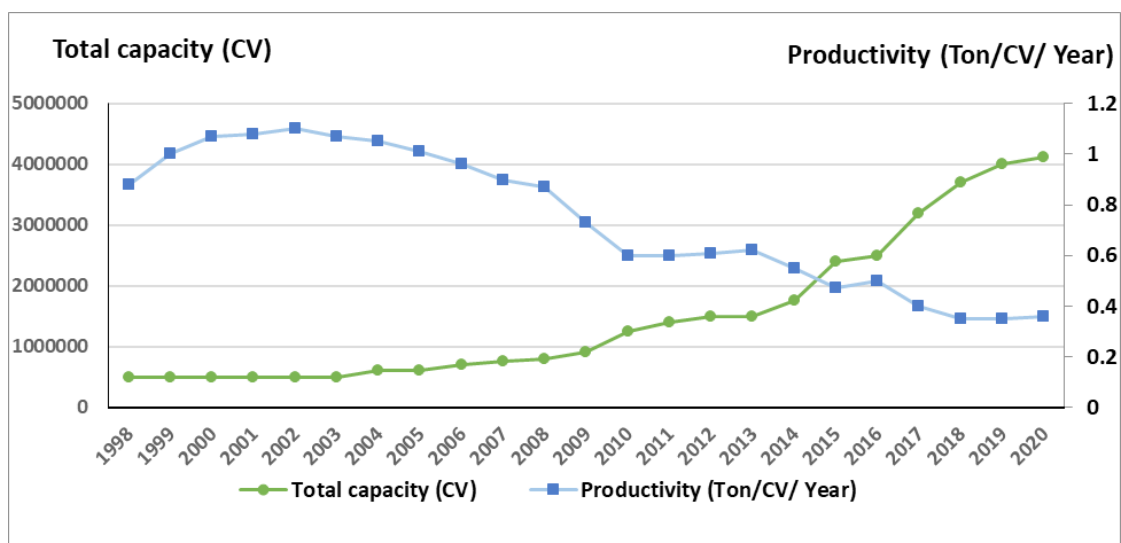
**Figure 1. Number of fishing vessels in Viet Nam in 2014-2019 by engine capacity**

The fishery industry generates revenue for the populace, which helps to reduce poverty. The fishing industry employs more than 4 million people, or 5.6% of all employed people in the country and 17% of all agricultural workers (General Department of Fisheries, 2020). Currently, there are around 40 different types of marine fishing gears in Viet Nam that may be divided into six main groups, including gillnet, trawl, purse seine, hook and line, stick-falling net, and others (Figure 2).



**Figure 2. Proportion of marine capture fishing gears in Viet Nam**

Recent years, the impacts of climate change influence many different elements of human and animal existence globally, of which the fisheries sector is considered the most affected (Brander, 2010). Changes in physical, biological brought on by climate change affect aquatic species' growth, reproduction, migration, and dispersion (Sumbly et al., 2021; Yasumiishi et al., 2020). Climate change indirectly impacted food intake, competitors, predators, and pathogen issues through ecosystems (Williamson & Guinder, 2021). In many places, particularly in regions with high water temperatures, climate change decreases the revenue and profits that businesses and families make from fishing activities. Cheung et al. (2009) predicted that between 2005 and 2055, the tropics' fishing potential could decrease by up to 40% as a result of climate change. Because Vietnam is a tropical country, the fisheries industry may suffer as a result of climate change. This phenomenon is still growing since the fishing business expands on its own, the regulation of fishing boats is still insufficient, and there are too many fishing boats for each sea area's fish stock size, particularly in the near-shore waters.



**Figure 3: Changes in total boat capacity and fishing productivity**

Decree 67/2014/ND-CP on supporting loans for new offshore fishing vessels, supporting fuel costs, supporting insurance, supporting to reduce post-harvest losses, supporting to overcome risks, and supporting information equipment to monitor the activities of fishing vessels at sea are a few of the policies that Vietnam has released to support and encourage offshore fishing, increasing production and aiding in the development of the offshore fishing fleet (Government, 2014).

The number of coastal ships has not dropped, nevertheless, and coastal fishing is more competitive, which lowers productivity. Fishermen frequently alter factors of the fishing process that the government cannot regulate, such as the number of boats they possess, the number of people that participate in the fishing operation, or the engine capacity. On the other hand, because of the diversity in the fisheries sector in Vietnam, the management organizations have encountered numerous challenges in determining the resources and regulating the catch by each type or different industry. The annual operational plans, five-year plans, and even plans covering more than ten years (such as the Master plan of fisheries sector) identify fishing targets based on aggregated data by water area and in accordance with administrative boundaries rather than the output of each type of fishery. Since then, there has been no discernible basis for issuing quota-based fishing licenses to ship owners and other organizations. The Fisheries Law of 2017 states that fishing will be managed and controlled with varied levels of restriction for each species, although this restriction system has not yet been implemented. Vietnam's policymakers have been looking for better management techniques and procedures to accomplish both economic and ecological objectives in this context.

## 2. THEORETICAL FRAMEWORK

### 2.1. The Bioeconomic Model

Beginning with the natural growth function, various functions have been estimated incorporating determined environmental conditions through the sea surface temperature. We have specifically estimated the most used functions in the literature on natural resource economics (Logistic, Ricker, Cobb-Douglas and Cushing function, respectively).

(1)

$$X_{t+1} = aX_t - bX_t^2 + cT_t - h_t$$

$$X_{t+1} = ae^{bX_t + cT_t} - h_t$$

$$X_{t+1} = aX_t^b T_t^c - h_t$$

$$X_{t+1} = aX_t^{b+cT_t} - h_t$$

where X denotes the fish biomass, t the time (year), h the catches, a, b and c are the parameters that collect biological information and T denotes the sea surface temperature.

In general, the functions shown in (1) result in significant parameters to the accepted levels usually found in the contrasts of statistical inference hypotheses, except for the first expression. In order to compare these expressions, we have used selection criteria of models based on the explicative capacity of the model. We have used the adjusted coefficient of determination,  $(\overline{R})^2$  (the maximum value for all of them), and the criteria based on the error prediction, the AIC Akaike statistic (minimum value for all of them).

With respect to fishing industry technology, the function usually used in the economic literature concerning fisheries is of the type Cobb-Douglas:  $H_t = \alpha X_t^{\beta_1} E_t^{\beta_2}$ , where  $\alpha$  denotes the catchability coefficient and  $\beta^1$  and  $\beta^2$  represent stock and effort elasticity, respectively.

With these premises and in a context of centralised resource management (the European Commission in our study case), the economic problem consists of choosing the total catches (h), which maximise the profits that are generated in the fishery (ph-wE) discounted at the initial moment, and taking into account the fish population growth. The bio-economic model applied to the European sardine fishery is represented by the following expression:

$$\text{s.a. } \dot{X} = \frac{dX}{dt} = X(t+1) - X(t) = aX(t)^{b+cT(t)} - X(t) - h(t)$$

$$X(t) > 0$$

$$0 \leq h(t) \leq h_{\max}$$

Using the optimum control theory (Kamien & Schwartz, 2012) for solving the above problem, the solution for the above is represented by the following expression:

(2)

$$\beta_1 A X(t)^{\frac{\beta_1 + \beta_2}{\beta_2}} (aX(t)^{b+cT(t)} - X(t)^{\frac{1}{\beta_2}} + \left( p - A X(t)^{\frac{\beta_1}{\beta_2}} (aX(t)^{b+cT(t)} - X(t)^{\frac{1-\beta_2}{\beta_2}} \right) \times (a(b+cT(t))X(t)^{b+cT(t)-1}) - \delta \left( p - A X(t)^{\frac{\beta_1}{\beta_2}} (aX(t)^{b+cT(t)} - X(t)^{\frac{1-\beta_2}{\beta_2}} \right) = 0$$

$$\text{Where } A = \frac{w}{\beta_2 \alpha^{\frac{1}{\beta_2}}}$$

From the above expression and substituting the respective parameters, the value of the sardine biomass is estimated.

One should note that these values will depend on the sea surface temperature levels (T) in each instant of time. Once the biomass has been estimated, the catch levels can be obtained from the natural growth expression and the corresponding effort level from the fishing technology expression.

## 2.2. Maximum Economic Yield Strategy

Fisheries have the potential to generate another type of income related to common (community) ownership of fishery resources, known as resource returns, which is income from fisheries after production costs and ordinary profits have been removed.

According to the above indicators, the resource returns of fisheries using a sustainable fishing model is represented by the following expression:

$$\ln(E) = TR(E) - TC(E)$$

The resource returns of fisheries is the revenue that removed all costs, therefore, it depends on the fishing effort. Assuming that the objective of fisheries management is to generate the greatest resource return, we calculate the fishing effort used to achieve this goal.

For the most efficient calculation of effort, it can be assumed that only one owner has full control over the fishery (Gordon, 1954) were the first proponents of this approaches. Necessary condition for maximum resource returns,  $\ln(E)$ .

$$\frac{d(\ln E)}{d(E)} = MR(E) - MC(E) = 0$$

Therefore, we have the following conditions to maximize resource returns:

$$MC(E) = MR(E)$$

The marginal effort cost  $MC(E)$  on the left side is the same in both rules, but the right side is different. Open-access fisheries have increased fishing effort and declining stocks until the average revenue  $AR(E)$  equals the marginal effort cost at the bioeconomic equilibrium. For maximum resource returns, fishing effort needs to be reduced to a level where marginal revenue  $MR(E)$  equals marginal cost.

Resource returns reach their maximum value when fishing with maximum economic yield, abbreviated as MEY (maximum economic yield). Reducing fishing effort relative to that of open-access fisheries can help reduce production costs or increase revenue. Fishing requires two main inputs: fishing effort and stock, as shown in the production function. In order to catch a large amount of fish, it is possible to use a lot of effort and choose a small stock of fish, or a little effort and choose a large stock of fish. From here, we distinguish between two different equilibrium points, without considering the time required to transfer from one stock level to another. The sustainable yield curve and the above analysis allow the comparison of different bio-economic equilibrium states regardless of the time dimension. From the above analysis, the low-effort and large resource reserves state is better than the high-effort and small-resource state.

### 3. RESEARCH METHOD

#### 3.1. Data collection methods

Sea surface temperatures were taken from NASA's MEaSURES program

Secondary data were collected from 2007 to 2022, from the following sources:

- World Bank data (website: <https://data.worldbank.org>)
- Intergovernmental Panel on Climate Change (IPCC)
- Directorate of Fisheries – Ministry of Agriculture and Rual Development of the Socialist Republic of Vietnam.

#### 3.2. Calculation and analysis model

##### 3.2.1. Species Growth Functions

Although the Logistics function is widely used in many fisheries economic documents, other functions can also be considered (Anderson & Seijo, 2010). Therefore, we calculated and compared four reserve populations function with integrated effects of SST (Sea Surface Temperature) to find the most realistic reserve function, including: Cobb-Douglas, Logistic, Ricker, and Cushing function summarized in Table 1.

**Table 1: Species Growth Functions of Vietnam**

	Formula		Reference
Cobb-Douglas	$S_{t+1} = mS_t^{a_1}K_t^{a_2} - Q_t + v_t$	(1)	(Diop et al., 2018)
Logistic	$S_{t+1} = mS_t + a_1S_t^2 + a_2K_t - Q_t + v_t$	(2)	(Diop et al., 2018)
Ricker	$S_{t+1} = mS_t e^{a_1S_t + a_2K_t} - Q_t + v_t$	(3)	(Diop et al., 2018)
Cushing	$S_{t+1} = mS_t^{a_1 + a_2K_t} - Q_t + v_t$	(4)	(Diop et al., 2018)

Where  $S_t$  = fishery stock in year  $t$ ;  $Q_t$ = yield at time  $t$ ;  $K_t$  = sea surface temperature (SST) at year  $t$ ;  $v_t$  is the errors, which is assumed to follow a Gaussian normal distribution:  $N(0, \sigma_5)$ ; Parameters  $m$ ,  $a_1$  và  $a_2$  represent different biological and environmental sensitivities.

Using SPSS software with time series data between 1990 and 2020 to determine the coefficients of the stock functions in Table 3.

**3.2.2. Production Function**

In this study, The Production Function used is the Cobb-Douglas function, as in (Rahim et al., 2019).

$$Q_t = nS_t^{b_1} E_t^{b_2} + u_t Q_t = nS_t^{b_1} E_t^{b_2} + u_t \quad (5)$$

Where  $E_t E_t$  = fishing effort at time  $t$ ;  $u_t$  = errors between estimated fishing yields, assumed to follow a Gaussian standard distribution; Parameter  $nn$  = fishing skills; The coefficients  $b_1$  and  $b_2$  represent the elasticity of the ability to catch  $Q_t$  tons of fishery under the condition of biomass  $S_t$  and fishing effort  $E_t$  respectively; Random variable  $u_t$  follows a Gaussian normal distribution; The level of effort is assumed to correspond to the total number of boats per year.

Using SPSS software with data from 1990 to 2020 to calculate the parameter of equation (5), if  $P > 0.05$ , the coefficient is not statistically significant, and if  $P < 0.05$ , the coefficient is statistically significant. The results are shown in Table 4.

**3.2.3. Fishing management and Climate secario**

This section finds out the optimal capture fisheries management strategy, the article calculates and compares three possible management strategies including: (i) Maintaining the status quo, (ii) Closure (promulgation of fishing ban), and (iii) Maximun Economic Yield (MEY)

The total catch depends on fishing efforts ( $E_t$ ), and fish stocks. Therefore, the first step is to calculate the natural reserve of fishery products and the production of fishery products. However, the fishery stocks studied are located in the sea, so they will be affected by the sea surface temperatures ( $K_t$ ). Then, the bioeconomic model is calculated based on the three management strategy scenarios summarized in Table 2. Since then, these management strategies are calculated under the impact of climate change affecting fishery stocks through changes in sea surface temperature.

**Table 2: Strageic scenarios of Fishery Management and the Rate of Sea Level Warming**

Fisheries management strategy	The annual rate of sea level warming is 0,01°C (minimum)
Maintaining the status quo	Management Strategy 1
Closure (promulgation of fishing ban)	Management Strategy 2
Maximun Economic Yield (MEY)	Management Strategy 3

These three management strategies were calculated in the context of climate change proposed by the IPCC. The author calculated the data based on the SST database system provided by NOAA.

## 4. RESULT AND DISCUSSION

### 4.1. Result

#### 4.1.1. Climate scenario

The following three strategies for management are estimated in the context of the IPCC's (Intergovernmental Panel on Climate Change) recommendations about climate change: Since the base year 2013 was 26.350°C, the rate of warming every year is at least 0.01°C (Solomon et al., 2007). This is the minimal global warming scenario with the highest probability (Sumaila et al., 2011). According to Sanz et al. (2017), the growth function of the fisheries will be impacted by the warming of the sea surface.

The annual change in sea surface temperature is represented by the following function:  $K_{t+1} = K_t(1 + \Delta_{min})$ , with  $K_t = 26.35^\circ\text{C}$  (the average SST temperature recorded over the most recent period, 2009–2013).

#### 4.1.2. Species Growth Functions

The results are summarized in Table 3, which utilizes the formulas in Table 1 to calculate the stock functions' coefficients using time series data for the years 1990 through 2020.

**Table 3. Estimated parameters of fish stocks**

	<b>Cobb-Douglas</b>	<b>Logistic</b>	<b>Ricker</b>	<b>Cushing</b>
$m$	.555 (0.034)	3.89 (0.527)	2.21 (0.007)	0.27 (0.648)
$a_1$	1.100 (0.007)	-3.24E-05 (0.726)	-2.33E-05 (0.631)	2.82 (0.030)
$a_2$	.468 (0.031)	-192.98 (0.372)	-0.34 (0.579)	-0.19 (0.103)
R <sup>2</sup> adjusted	0.73	0.82	0.52	0.39

Note: p-values are in parentheses

In contrast to the other functions, which do not satisfy the Cobb-Douglas function's coefficients with statistical significance ( $P > 0.05$ ), Table 3 demonstrates that the Cobb-Douglas function's coefficients are significant at the 5% level ( $P < 0.05$ ). As a result, fish production is described using the Cobb-Douglas function. The fact that the elasticity for sea surface water temperature (SST) is relatively high ( $a_2 a_2 = 0.468$ ) indicates that the effect of sea surface temperature is notable.

#### 4.1.3. Production Function

Table 4 provides the results of the parameter calculation for equation (5) following the execution of SPSS using the 1990–2020 data. The function can be utilized to represent the output of exploitation because the coefficients are statistically significant ( $P > 0.05$ ) and  $R^2$  is relatively high. It is noteworthy to observe that the elasticity with respect to fishing effort ( $b_2$ ) is almost as strong as the elasticity with respect to stock ( $b_1$ ).

**Table 4. Estimation results of fishing yield**

	$Q_t = nS_t^{b_1} E_t^{b_2}$
n	1.209 (0.024)
$b_1$	0.485 (0.010)
$b_2$	0.622 (0.008)
R <sup>2</sup>	0.89
R <sup>2</sup> adjusted	0.92

Note: p-values are in parentheses

**4.1.4. Fishery Management**

To figure out the best management strategy for Vietnam’s fisheries, three different scenarios are calculated.

**a. Fishing Status Quo**

The first strategy, termed ‘Status Quo’, consists in maintaining the fishing effort at its current level.

$E_t = 91.716$  ships, where  $t = 2020, \dots, 2050$  (the number of ships remains unchanged)

“What is most likely to occur?” will be figured out by the result of this scenario.

**b. Closure**

The second pattern, denoted as ‘Closure’, relates to a ban for this fishery.

$E_t = 0$  where  $t = 2020, \dots, 2050$  (years where the catch was zero)

In order to address the question, “What might happen if we stopped fishing?” this hypothetical scenario takes into account an “extreme” future.

**c. Maximum Economic Yield Strategy**

Here we investigate a more normative management strategy based on the intertemporal optimisation of the rent derived from fishing, which is called MEY (maximum economics yield) (Clark, 1974). This strategy is frequently used when fishing grounds, some collaborative groups of fishers, or specialist fishing associations are controlled by the government. In more mathematical terms, the bioeconomic program is to maximize the discounted value of the profit while maintaining with a constrained relationship between the maximum sustainable yield, the sea surface temperature due to climate change, and fishing effort:

$$\pi = pQ_t - cE_t \tag{6}$$

Where p represents the unit price of harvest while c represents the unit cost of effort. Adopting a risk neutral attitude in the sense that random fluctuations of stock and harvest are not considered in the regulator’s computation, the bioeconomic program can thus be written as:

$$\max_{E_t} \sum_{t=2020}^{\infty} \frac{\pi_t}{(1+r)^{(t-2020)}} \tag{7}$$

st: 
$$S_{t+1} = mS_t^{a_1}K_t^{a_2} - nS_t^{b_1}E_t^{b_2} \tag{8}$$

Where K is the sea surface temperature.

The solution of the above problem requires the use of optimum control theory (Kamien & Schwartz, 2012). Assuming for a while that the temperature  $\theta$  is at equilibrium, it can be proved that the long-term optimal equilibrium is given implicitly by the relation:

$$\left[ p - AS_*^{\frac{-b_1}{b_2}} (mS_*^{a_1}K_*^{a_2} - S_*)^{\frac{(1-b_2)}{b_2}} \right] \times (mnS_*^{a_1-1}K_*^{a_2} - 1) / \left[ p - AS_*^{\frac{-b_1}{b_2}} (mS_*^{a_1}K_*^{a_2})^{\frac{1-b_2}{b_2}} \right] + p^T \nabla \mathcal{L}^*_{p^S} \frac{(\nabla \mathcal{L}^*_{\theta^T} K_{\theta^S} - \mathcal{L}^*)_{p^S}}{-(p^T + p^S)} \setminus \left[ b - \nabla \mathcal{L}^*_{p^S} \frac{(\nabla \mathcal{L}^*_{\theta^T} K_{\theta^S})_{p^S}}{(r - p^S)} \right] = 1. \tag{9}$$

Where  $r = \delta - 1 - 1$  is the discount rate and  $\delta$  stands for the discount factor ( $0 < \delta \leq 1$ ), while parameter A equals  $= c \left( \frac{1}{b^{b_2} b_2} \right)^{-1}$ .

The above first order condition obtained in the steady state, when the fisheries economy is structured to strike a balance between growth and environmental integrity. This function gives an implicit solution for



the stock under MEY, which can be understood as a rule: we should should invest into the resource up to the point where the economic return of marginal investment (Marginal Utility) is equal to the social discount rate (marginal stock) (Lara & Doyen, 2008). In the above formula, we see that the optimal biomass level ( $S_*$ ) depends on the sea surface temperature ( $K$ ) and therefore we will hereafter denote this optimal biomass level as  $S_*(K)$ . According to the optimal control theory, and in the steady state, from equation (1) we deduce:

$$Q_*(K) = mS_*(K)^{a_1}K^{a_2} - S_*(K) \tag{10}$$

From the two formulas (10) and (5), we have the fishing effort:

$$E_*(K) = \left[ \frac{H_*(K)}{nS_*(K)^{b_1}} \right]^{\frac{1}{b_2}} \tag{11}$$

Regarding the numerical values based on the Viet Nam case study, the unit price of landings is set at  $p = 138,000$  đong/kg (mean output price over the period studied), while the cost per unit of effort is fixed at  $c = 10,000,000$  dong/day, which corresponds to the mean cost per day at sea. The discount rate is first set at  $r = 7\%$ . The parameter values are summarized in Table 5.

**Table 5. The value of the parameter about Growth parameters, Production parameters, temperature variation and economy**

	Parameters	Value
Growth parameters	$m$	0.555
	$a_1$	1.100
	$a_2$	0.468
Production parameters	$n$	1.209
	$b_1$	0.485
	$b_2$	0.622
Mean output price (dong/kg)	$p$	138,000
Mean cost per unit day (dong/day)	$c$	10,000,000
Discount rate (%)	$i$	0.07
Minimum rate of temperature rise ( $^{\circ}C/n\grave{a}m$ )	$\Delta_{(min)}$	0.01

Using SPSS with the input data as the parameters in Table 5 to estimate the species growth functions [function (1)], the production function [function (5)], and the profit function [function (7)] of each management strategy under climate conditions will increase  $0.01^{\circ}C$  per year, with  $t = 2020-2050$ . The results are described in Table 6.

**Table 6. The result about biomass, catches, and profit of fishing effort strategies under the climate scenario.**

Year	The harvesting strategy 1: The Status Quo			The harvesting strategy 2: The closure of the fishery			The harvesting strategy 3: Maximum Economic Yield (MEY)		
	Biomass (tons)	Catches (tons)	Profit (đong)	Biomass (tons)	Catches (tons)	Profit (đong)	Biomass (tons)	Catches (tons)	Profit (đong)
2020	5,075,143	3,249,711	9,645,187,352,607	5,143,951	0	0	5,024,042	3,370,472	12,883,945,148,434
2021	4,823,059	3,359,528	11,255,278,386,146	5,194,346	0	0	4,937,845	3,486,583	16,287,532,637,178
2022	4,698,914	3,473,673	12,695,968,612,233	5,369,746	0	0	4,968,390	3,650,501	19,350,613,948,203
2023	4,598,999	3,623,588	14,537,574,303,818	5,543,973	0	0	4,837,252	3,831,165	21,407,374,767,370
2024	4,479,125	3,793,462	16,416,373,514,167	5,775,050	0	0	4,823,483	3,996,033	23,649,854,642,750
2025	4,361,949	3,950,638	17,789,437,989,188	5,910,178	0	0	4,735,787	4,255,231	26,168,830,845,541

2026	4,344,693	4,157,894	19,641,264,954,943	6,034,113	0	0	4,716,978	4,477,135	27,743,432,249,007
2027	4,208,240	4,314,347	20,483,824,033,510	6,295,202	0	0	4,534,520	4,710,252	29,110,195,839,663
2028	4,066,408	4,446,179	20,819,178,375,999	6,704,563	0	0	4,480,713	4,892,701	29,545,888,868,781
2029	4,018,205	4,540,531	20,577,828,622,424	7,101,168	0	0	4,486,670	5,104,374	30,173,788,109,335
2030	3,900,707	4,621,880	20,134,611,980,735	7,514,871	0	0	4,541,723	5,282,493	30,384,849,624,042
2031	3,843,389	4,709,198	19,723,240,240,306	7,947,007	0	0	4,551,176	5,426,623	29,899,670,952,554
2032	3,771,136	4,751,451	18,842,590,759,480	8,098,666	0	0	4,565,088	5,481,432	28,488,000,116,869
2033	3,655,880	4,776,707	17,838,752,240,386	8,296,842	0	0	4,588,520	5,575,908	27,502,276,549,770
2034	3,507,378	4,693,209	15,964,640,220,083	8,289,108	0	0	4,599,289	5,500,336	25,199,186,172,166
2035	3,405,706	4,606,881	14,236,991,291,763	8,291,859	0	0	4,602,711	5,403,325	23,064,073,120,320
2036	3,282,654	4,539,933	12,810,410,260,931	8,234,139	0	0	4,739,042	5,280,787	20,785,447,880,053
2037	3,106,629	4,425,958	11,184,469,200,586	8,136,404	0	0	4,797,332	5,080,894	18,119,996,163,150
2038	3,047,705	4,230,482	9,189,906,612,326	8,002,046	0	0	4,821,899	4,912,856	15,999,404,863,705
2039	2,919,963	4,146,512	8,081,703,989,949	7,909,982	0	0	4,957,577	4,766,293	14,186,471,212,792
2040	2,874,231	4,002,625	6,741,066,828,153	7,801,289	0	0	5,200,616	4,593,155	12,391,216,250,851
2041	2,771,831	3,808,406	5,275,815,168,090	7,689,473	0	0	5,360,200	4,402,468	10,585,088,666,200
2042	2,653,077	3,602,299	3,914,835,131,013	7,632,669	0	0	5,527,150	4,263,386	9,224,152,246,495
2043	2,500,631	3,407,807	2,762,849,364,493	7,586,632	0	0	5,823,559	4,110,072	7,784,562,726,738
2044	2,484,187	3,223,139	1,787,125,811,006	7,501,264	0	0	5,970,635	4,035,002	5,709,838,246,262
2045	2,305,200	2,993,413	745,964,661,765	7,490,204	0	0	6,057,562	3,913,964	4,623,212,606,652
2046	2,270,975	2,860,047	195,698,359,309	7,481,775	0	0	6,089,358	3,812,369	3,850,958,988,955
2047	2,222,685	2,690,370	-413,359,170,745	7,408,271	0	0	6,103,144	3,711,030	3,112,360,168,958
2048	2,119,028	2,612,396	-642,398,016,264	7,400,973	0	0	6,109,666	3,665,253	2,744,433,283,811
2049	2,083,107	2,507,278	-923,013,611,741	7,354,096	0	0	6,158,547	3,555,178	2,227,035,972,116
2050	2,064,875	2,479,532	-942,220,455,672	7,301,260	0	0	6,163,063	3,550,178	2,066,999,705,439

Table 6 shows the status quo strategy will reduce the stocks, catches, and profits in fishing. If the status quo is maintained, the fishery situation is reaching alarming levels: by the end of 2047, both the quantity in stocks and catches will decline, profits will fall to negative.

With a strategy based on the closure of the fishery (no fishing), the prospect of fishery reserves will be more positive, as the results show that the first recovery phase appears, after that is the period of stabilization in 2045.

Notably, the Maximum Economic Yield (MEY) is ecologically feasible. Although there is a decline in biomass similar to the status quo strategy, but less pronounced. The profitability of the MEY is still completely positive, while the total reserve is greater than 0, indicating that Vietnam should consider applying this strategy to ensure the simultaneous achievement of both ecological and marine economic goal.

The results also demonstrate that even the slightest amount of global warming (an increase of 0.01°C per year) is quite concerning, at least in the late 1940s. This is because biomass production captures and revenues both fell, irrespective of the management strategy that was utilized. The status quo strategy (which maintains the fishing intensity recorded in 2020) has the worst effects on fisheries since it prevents stocks from ever recovering, which leads to a reduction in catches and negative profit from 2047. Fishery stocks can be rebuilt thanks to the sea closure policy up until 2035, but after that, the effects of global warming start to be felt, even if reserves usually start to stabilize by the end of 2050. The Maximum Economic Yield (MEY), in contrast to the status quo strategy, provides for a positive return during the whole forecast period, even though the return profits will be low but stable in the 2050s.

#### 4.2. Discussion

According to the research results (Figures 4 and 6), the current fishing method will eventually cause fish stocks to collapse. This is a consequence of the long-term drop in fishery production that has been

seen (Nghiep & Luong, 2019; Vĩnh et al., 2006). The two mechanisms underlying this bioeconomic vulnerability are as follows: First, the production function (Equation 5) states that the decrease in harvest is significantly influenced by the decline in stocks. This is because the catch elasticity for stocks ( $b_1 = b_1 = 0.485$ ) is not much difference to the yield elasticity to effort ( $b_2 = b_2 = 0.622$ ), despite the fact that fishing effort has significantly increased over time. Secondly, the adverse effects on stock dynamics of global warming scenarios through the increase in SST are very high since the elasticity ( $a_2 = a_2 = 0.468$ ). In other words, a temperature increase drastically changes the rate of stock renewal. When fishing effort is maintained at its current level, the combination and interaction of the two aforementioned negative mechanisms strongly explains the long-term bioeconomic collapse of the fishery as well as the significant drop in both fish catches and stocks.

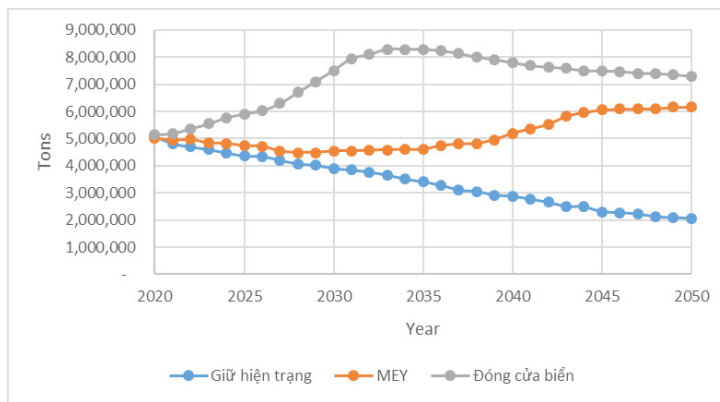


Figure 4. Forecasted fish biomass under climate change impacts

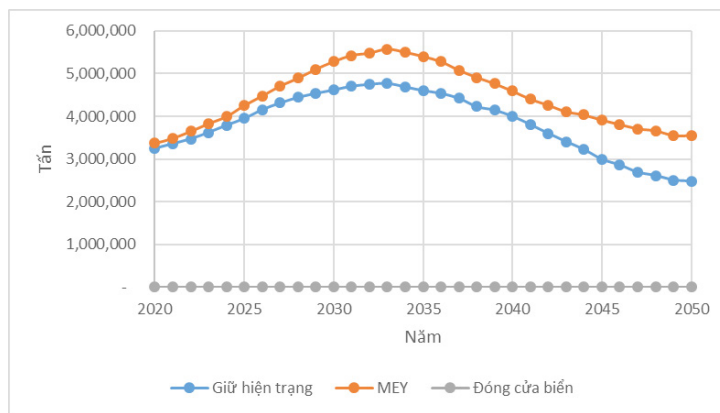


Figure 5. Forecasted fish harvest under climate change

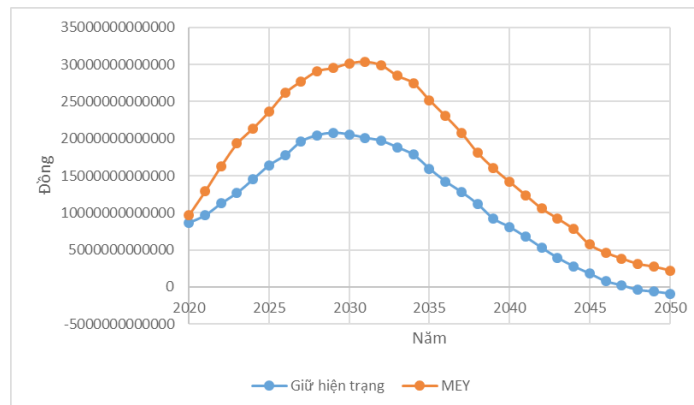


Figure 6. Profits under different catch management scenarios under climate change

An environmental vulnerability in the closure strategy (fishing ban) can be observed: after a brief period of shrimp biomass recovery, the stock starts to decline again from 2036. The fact that such erosion occurs even under the IPCC's least climate warming scenario (just a 0.01°C increase per year) is particularly highlighted. Given that the IPCC projects a potential warming of more than 0.04°C annually (Solomon et al., 2007), the reduction in fish biomass may really be worse than expected. Notably, recent research on the habitat traits of some aquatic species with high economic values, such as shrimp, has demonstrated that environmental parameters like sea surface temperature have an impact on shrimp productivity (Lopes et al., 2018). This implies that biological processes including growth, maturation, and survival are currently impeded and that this trend might get worse in the future. The catch will be permanently negative by 2047 if current fishing efforts are kept up; hence, a modification in current fishing tactics may be required to buck the trend.

The MEY strategy for management may contribute to lessening the adverse effects of climate change on the fisheries industry, as shown by Figures 4 and 6. Even if there is a chance that reserves, output, and profits could decrease due to climate change, the maximum economic yield still makes reserves and profits viable. It can successfully combine economic and ecological factors. The results of the MEY change over time depending on the temperature and the relevant stocks. In that sense, a strategy like that represents an effective response to climate change. These findings highlight the necessity of institutional systems to facilitate the management of climate change adaptation.

The maximum economic yield may have certain benefits in terms of sustainability (both ecologically and economically). But managing strategy The MEY has a number of drawbacks. First of all, as stressed by (Kompas et al., 2010), this strategy is a changing objective because it alters in response to forecasts regarding costs, prices, and temperature. In addition, market fluctuations in seafood prices make it challenging to calculate MEY, particularly given the recent steep rise in inflation and fuel prices (which account for 25% of all transportation-related costs). Overall, the three strategies discussed in this study may seem a little severe or strict and leave little room for citizen engagement. In contrast to the two other tactics (Status Quo and MEY), only the technique of simply terminating the fishery allows for the stock to be preserved (profits with MEY are also quite modest). An alternative intermediate strategy, as suggested by (Dichmont et al., 2010), could be to partially close the fishery and manage the closed portion as a marine protected area while continuing to exploit the remaining portions of the fishery using the MEY strategy. In addition, a transferable quota system can be applied at the same time as emphasized by (Sanz et al., 2017).

## 5. CONCLUSION

In this study, three fishing strategies are investigated under a minimal climate change scenario (0.01°C increase every year). Strategy 1: To maintain the status quo. Strategy 2: The closure of fishery . Strategy 3: Maximum Economic Yield (MEY). The findings indicate that fisheries will eventually collapse if fishing intensity are maintained at current levels (Strategy 1). Contrarily, the second strategy to stop fishing will assist sustain production but not profit. Due to the fact that both output and profits are stable, albeit at a low level in the context of global warming, the best economic output approach (approach 3) is feasible. To enhance approach 3, it should be paired with initiatives to reduce climate change to boost fishing productivity. To enhance approach 3, it should be combined with initiatives to reduce climate change to boost fishing productivity. Additionally, implementing MEY is difficult because the goal is unstable at all times. As a result, Vietnam may think about carrying out an alternative intermediate strategy that includes partial closure (creation of a marine protected area) while continuing to exploit the remainder with assistance. It additionally provides for the creation of a transferable quota system that can be used to simultaneously pursue ecological and economic objectives.

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## RESEARCH ON THE IMPACT OF GREEN HUMAN RESOURCE MANAGEMENT ON EXTRA-ROLE GREEN BEHAVIOR OF FIRMS IN VIETNAM

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**ABSTRACT:** *This study examined the impact of HRM (performance management & appraisal; rewards & payment; employee involvement & leadership) on extra-role green behaviors. At the same time, the mediating impact of green knowledge sharing. The study was conducted in Vietnam with the participation of a survey of employees at enterprises applying the environmental management system ISO 14001. The research results indicate that employee involvement & leadership and green knowledge sharing have direct positive in on extra-role green behavior in the Vietnamese iso 14001 certificates. This paper also confirms that employee involvement & leadership display indirect impact on extra-role green behavior via green knowledge sharing. There is no evidence to prove the statistically significant relationship between reward & payment and extra-role green behavior. However, reward & payment doesn't display extra-role green behavior via green knowledge sharing. Finally, this paper found no impact of performance management & appraisal direct and indirect on extra-role green behavior.*

**Keyword:** *Performance management & appraisal; Rewards & payment; Employee involvement & leadership; Extra-role green behavior*

### 1. INTRODUCTION

For the government, government green development behavior is closely linked to the institutional environment (Li et al., 2022) and also is a mainstay of driving the development of the green buildings industry (Fu et al., 2020). Within an organization, workplace pro-environmental behavior refers to a series of behaviors within the organization that are related to environmental sustainability or contribute to environmental sustainability, which includes in-role green workplace behavior and extra-role green workplace behavior (volunteer and self-starter) (Zhang et al., 2019). In general, green workplace behavior is a form of pro-environmental behavior (Safari et al., 2018 cited by Sabri et al., 2022). The extra-role green behavior of individuals contributes to improving and protecting the environment. Therefore, in this study, the authors focus on the study of promoting the engagement of green employees in practice related to performance management & appraisal, reward & payment, employee involvement & leadership and green knowledge sharing. At the same time, there is no specific study on the extra-role green behavior as well as research on the effects of green knowledge sharing. Along with that, extra-role green behavior outside the scope of employees' work still has much to be explored. waterfall. This is also a gap that needs more research focusing on understanding the relationship between underlying elements of green HR practices and extra-role green behavior.

Extra-role Behaviors were introduced early in the 1960s, Katz (1964) noted the behavior as an employee's willingness to contribute extra efforts for the attainment of organizational outcomes. While Organ (1977) came up with the construct of extra-role behavior as the contribution, which was not reflected in the measurement of the individual outputs but generally support the enterprise operation. Later then in the 1980s, Organ (1988) continued to have deeper analysis and develop his concept of ERB, drawing upon the notions of Katz (1964) cited by Brief & Motowidlo (1986), as the behavior that embraces the effectiveness and boosts the functioning of the organization without being recognized explicitly by the formal reward

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system. In the middle of the 1990s, Van Dyne et al., (1995) proposed their concept of ERB as “behavior which benefits the organization and/or is intended to benefit the organization, which is discretionary and which goes beyond existing role expectations”. Becker & Kerman (2003) also emphasized that ERB is discretionary, but overall improves the organizational efficiency.

With the necessity of green innovation these days, employees become better aware of their responsibility to take actions in which to ameliorate the global environmental problem beyond the requirement of the organizations. Norton et al. (2015) define extra-role green behavior as actions involving personal initiative that exceeds organizational expectations. According to Islam et al. (2021), ERGBs are not included in employees’ job descriptions because these are as simple as employees’ suggestions to protect the environment. Furthermore, due to Zhang et al. (2019), green behaviors are mostly voluntary, which are referred to as extra-role green behaviors. In previous studies, different aspects of GHRM practices have shown their impact on green behavior in the workplace, overall creating values for corporations. Due to limited time and resources, however, authors focus on evaluating the following HRM practical performance management & appraisal, reward & payment and employee involvement & leadership.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Social identity theory**

Social Identity Theory (SIT) is a psychological theory developed by Tajfel & Turner in the 1970s. It focuses on how individuals define and perceive themselves in relation to social groups, and how group membership influences their behavior, attitudes, and self-concept. According to Tajfel & Turner (1979), “Social identity is the individual’s knowledge that he belongs to certain social groups together with some emotional and value significance to him of the membership in these groups”. This definition highlights that social identity is a sense of belonging and identification with particular social groups, and it carries emotional and personal value for individuals.

Based on Social identity theory suggests that individuals derive part of their identity and self-esteem from their group memberships. When organizations adopt GHRM practices that prioritize environmental sustainability, it can create a shared group identity among employees who support and identify with these practices. This group identity fosters a sense of collective environmental concern and responsibility. SIT proposes that individuals are motivated to maintain a positive social identity and conform to the norms and values of their group. When organizations promote green initiatives and values through GHRM, employees who identify with these practices are more likely to engage in pro-environmental behaviors. This can include actions such as reducing waste, conserving resources, or advocating for sustainable practices within and outside the organization. According to, GHRM aim to support employees’ green behavior so that employee feel they are part of an important change in the environment. Besides, We suggest that Green Human Resource Management plays a role in reducing social uncertainty for employees by providing them with guidance on how to behave, what to expect, and the level to which they should identify with their colleagues in relation to green knowledge-sharing and green service behavior. Employees who are committed to upholding this organizational culture are more likely to be motivated to engage in green knowledge-sharing behavior and green service behavior. These motivations serve as a bridge between GHRM, green knowledge-sharing, and green service behavior.

### **2.2. Performance management & appraisal**

Performance appraisals are a form of providing feedback, deciding promotions or termination, determining compensation, identifying strengths and weaknesses or areas for change and identifying development needs



that can help with career planning (Wessel, 1985) - the quality of an individual's (Macwan & Sajja, 2013). On the other hand, performance appraisal was considered the process of assessing the performance and progress of an employee or a group of employees (Fletcher, 2001) and is a key tool for organizations to make the most of their human resources (Armstrong & Baron, 2005). According to McAfee & Champagne (1993), Performance management, in essence, is a system which combines, clarifies, and strengthens the relationship between corporate goal setting and planning, employee development programmes, and performance review and appraisal. Authors DeNisi & Smith (2014) provide a similar definition. In simpler terms, Performance management is a broad set of activities aimed at improving employee performance (DeNisi & Pritchard, 2006) for improving organizational performance (Armstrong, 2006).

The findings of Pinzone et al. (2016) suggested that including environmental aspects in performance management increases employees' willingness to put extra effort into EM (Environmental Management). In addition, green management of organizational culture is the most used method to increase employee commitment and awareness toward the environment, followed by green performance management & appraisal (Masri & Jaaron, 2017). When employees are given opportunities for involvement in environmental issues and are motivated by green performance management policies, this significantly encourages them to acquire and utilize training in green knowledge and skills to contribute to hotels' environmental protection activities (Pham et al., 2019). Therefore, recent research such as Saeed et al (2019); Chaudhary (2019); Ojo, Tan & Alias (2020); Islam et al (2020); Muisyo & Qin (2021)... supported that performance management & appraisal, part of GHRM, have a positive relationship with employee's extra-role green behaviors.

The authors expect that performance management & appraisal positively impacts extra-role green behavior within Vietnam's organizations from the above analysis. Therefore, the following hypothesis is proposed:

*H1: Performance management & appraisal have direct positive effect on employees' extra-role green behavior.*

### **2.3. Reward & Payment**

The reward & payment could be any type of compensation/incentive program that is used to support the accomplishment of specific objectives (Rubino, 1997; Newman et al, 2016) or it is defined as those objects, which employees will work to acquire through the allocation of time, energy, or effort (Arias-Carrión et al., 2010). Therefore, in general, the reward is generally understood as the total amount of financial and non-financial compensation or total remuneration provided to an employee in return for labor or service rendered at work (Anku et al., 2018; Jeni et al., 2020).

In the environmental field, the green reward & payment is a system of financial and non-financial, being created to reserve and stimulate employees' pro-environmental behaviors (Jabbour et al., 2013; cited by Saeed et al., 2018). Due to Jabbour et al. (2008; 2011), employees become more inspired by nonfinancial rewards through green pay and reward, such as praise and recognition. Renwick et al. (2013) also pointed out employee green performance would be motivated as they received appreciation and support. Drawing upon previous research, a reward system should be added as a well-promoted factor which improves the efficiency and frequency of employees' green behaviors. Thus, recent research such as Dumont et al. (2017), Zhang et al. (2019) and Chaudhary (2019) supported that reward systems, as a part of GHRM, have a positive relationship with employees' extra-role green behaviors.

The authors expect that the reward system positively impacts extra-role green behavior within Vietnam's organizations from the above analysis. Therefore, the following hypothesis is proposed:

*H2: Reward & payment have a direct positive effect on employees' extra-role green behavior.*

#### **2.4. Employee Involvement & Leadership**

Early involvement was defined as the “cognitive belief states” of employees and was distinguished from satisfaction and behavior (Kanungo, 1982). In the study of Kearney (1997), employee involvement has been conceptualized as the process of developing the feeling of psychological ownership among organizational members and has been implemented via the participation of employees in information processing, decision-making and/or problem-solving. Employee involvement is an important enabler for strengthening individual commitment and voluntary behavior towards the environment at work and the hotel's environmental performance (Pham, 2010)

Currently, there is no exact definition of employee leadership in enterprises. The terminology usually calls by the nearest term is employee empowerment. Conger & Kanungo (1988) defined empowerment as a process of enhancing feelings of self-efficacy among organizational members through the identification of conditions that foster powerlessness and through their removal techniques by both formal organizational practices and informal of providing effective information. Besides, Wilkinson (1998) points out that empowerment is regarded as providing a solution to the age-old problem of Taylorised and bureaucratic workplaces where creativity is stifled and workers become alienated, showing discontent through individual or collective means.

Literature review shows that employee involvement has a direct impact on extra-role green behavior (Chaudhary, 2019; Chen et al., 2021; Purba & Tikurura, 2022). According, Chaudhary's (2019) research on green human resource management in the Indian auto industry emphasizes that to reap more benefits, employees also need to be allowed to participate in the organization's green initiatives because this will encourage them to come up with more creative ideas and make meaningful contributions to the achievement of green goals. Besides, Zhang et al (2019) also pointed out that employee empowerment (set up of green champions/task force/green team, etc.) allows employees to improve environmental behavior in a hands-on manner. Employee empowerment directly impacts on extra-role green behavior (Zhang et al., 2019). From the above analysis, the authors expect employee involvement & leadership to have a positive impact on extra-role green behavior within Vietnam's organizations. The authors propose the following hypothesis:

*H3: Employee involvement & leadership have direct positive impact on employees' extra-role green behavior.*

#### **2.5. Green knowledge sharing**

Green knowledge sharing in a green supply chain refers to the exchange and dissemination of green marketing and technological knowledge among the manufacturer and its supply chain partners (Song et al., 2020). The objective is to foster the development of innovative techniques and opportunities that effectively reduce the negative environmental impacts associated with supply chain activities. This process involves the sharing and transfer of knowledge related to sustainable practices, environmentally friendly technologies, and strategies for minimizing ecological footprints. By promoting the sharing of green knowledge, organizations aim to enhance their collective understanding and capabilities in implementing environmentally conscious practices throughout the supply chain. In the study of Chang & Hung (2021), green knowledge sharing is defined as the behavior that members of a company who are keen to pass on information and knowledge about green issues to others, promote learning opportunities and encourage others to learn, and create new knowledge for each other.

Some previous study points out that, green knowledge sharing have direct effect on (Rubel et al., 2021) Green knowledge sharing increased knowledge and empowers employees to engage in extra-role

green behavior, which refers to voluntary actions taken by employees that go beyond their formal job responsibilities to contribute to environmental conservation and sustainability. In their study, Saeed et al. (2019) argue that environmental knowledge reduces the impact of GHRM on extra-role green behavior.

From the above analysis, the authors expect employee involvement & leadership to have a positive impact on extra-role green behavior within Vietnam's organizations. The authors propose the following hypothesis:

*H4: Green knowledge sharing have direct positive impact on employees' extra-role green behavior.*

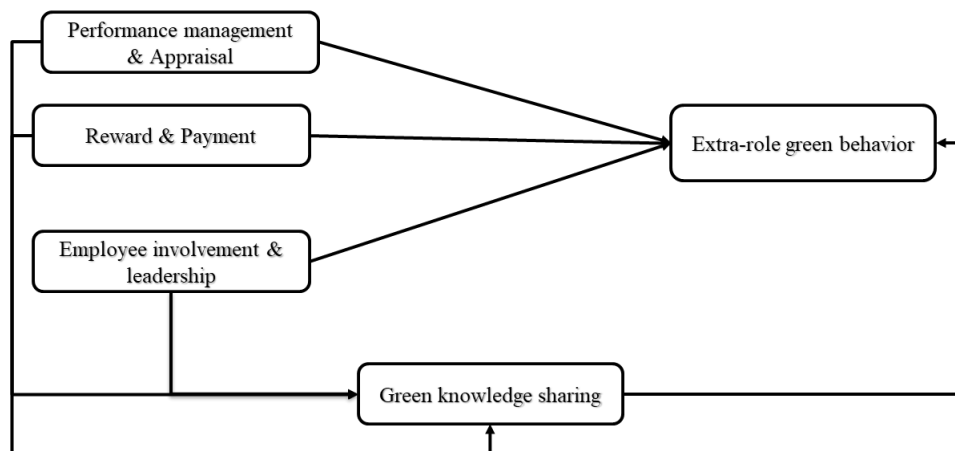
## 2.6. GHRM and Green Knowledge sharing

Research suggests that there is a positive relationship between GHRM and green knowledge sharing. When organizations prioritize and support environmental sustainability initiatives through their HR practices, employees are more likely to engage in knowledge-sharing related to green practices. The positive relationship between GHRM and green knowledge sharing can be explained by several factors. Firstly, when organizations demonstrate their commitment to environmental sustainability through GHRM practices, it signals the importance of green initiatives and encourages employees to participate and contribute. Secondly when employees perceive that their organization values and rewards green knowledge sharing, they are more motivated to engage in such behaviors. The literature also agrees that GHRM in the organization is positively related to green knowledge sharing (Rubel et al., 2021). As mentioned above, in this study, the author focuses on human resource management activities including performance management & appraisal, reward & payment and employee involvement & leadership. So, we proposed the hypothesis:

*H5: Performance management & Appraisal have direct positive impact on Green Knowledge sharing*

*H6: Reward & Payment have direct positive impact on Green Knowledge sharing*

*H7: Employee Involvement & Leadership have direct positive impact on Green Knowledge Sharing*



**Figure 1: Research Model**

## 3. RESEARCH METHOD

The study was carried out in Vietnam and involved firms applying ISO 14001. 47 out of 332 enterprises on the list of enterprises applying ISO 14001 accepted to participate in the survey. HR departments choice randomly select 15-20 willing employees to participate in the survey. Given that the participants were Vietnamese, the questionnaire was translated from English to Vietnamese by members of the research team. A pilot survey was also conducted with 30 employees to obtain feedback and resolve any wording issues that arose, to ensure the questionnaire's ease of use. The survey questionnaire is composed of two parts: i) General information (age, gender, educational background, department, company size); and ii) survey

questions relating to variables (performance management & appraisal, reward & payment, employee involvement & leadership, green knowledge sharing, and extra-role green behavior).

**Table 1: Origin of scales**

Construct	Code	Item	Citation source
Performance management & appraisal	PMA1	HR department of our company establishes clear objectives of green practices for each employee	Muisyo & Qin (2021)
	PMA2	Our company evaluates employee performance based on the achievement of environmental objectives	
	PMA3	Individual environmental performance is monitored by the HR manager in our company	
Reward & payment	RP1	Non-monetary rewards such as public recognition, praises, gifts and leaves are given to employees with high environmental performance	
	RP2	Monetary rewards such as cash, premiums and bonuses are given to employees for their high environmental performance	
	RP3	Employees with eco-initiatives are promoted to motivate other employees	
Employee Involvement & Leadership	IL1	Employees are involved in Environmental Management in our Company	
	IL2	Employees are engaged and empowered to make environmental suggestions	
	IL3	Employees' tacit knowledge is tapped by management through promoting them to basic-level leadership	
Green Knowledge sharing	GKS1	I always share green knowledge obtained from newspapers, magazines, journals, television and other sources	Rubel, Kee & Rimi (2021)
	GKS2	I enjoy sharing environment-friendly knowledge with my colleagues	
	GKS3	In my organization, people share expertise from work experience with each other	
	GKS4	Sharing my knowledge with colleagues is pleasurable	
	GKS5	I believe that knowledge sharing can benefit all parties involved	
Extra-role green behavior	EGB1	I took a chance to get actively involved in environmental protection at work	
	EGB2	I took the initiative to act in environment-friendly ways at work	
	EGB3	I did more for the environment at work than I was expected to	

The authors of the survey conducted a sample collection and were able to eliminate any invalid surveys, resulting in a total of 272 surveys (27.2%) being collected. The data collected from the surveys were analyzed using SPSS, which included various techniques such as reliability testing, EFA, CFA and SEM.

**4. RESULT AND DISCUSSION**

**4.1. Results**

*Descriptive statistic*

The results show that the equal ratio of male and female are 49.63% and 50.37%. Most employees have university diplomas accounting for 41.5%, followed by masters, others and high school/vocational school respectively at 33.8%, 12.9%, and 11.8%. The main ages of the study sample are 31-40 years old (32.4%) and 20-30 years old (30.9%); the other age groups have the following proportions: above 50 years old (16.2%), 41 - 50 years old (12.5%) and less than 20 years old (8.1%). 68.0% of respondents are living in Northern Vietnam, the South (14.35%) and the Central region (17.65%). Applicants are mainly employed and working in the public sector (36.4%), followed by private (29.4%), foreign (21.0%) and

finally joint ventures (13.2%). The size of enterprises that the survey collects the most is above 1000 employees (28.7%), the second is 100 - 499 employees (26.1%), the third is 50 - 99 employees (19.5%); enterprises with less than 50 employees and 500 - 1000 employees have the same rate of 12.9%. The detail of the sample presented in the table below.

**Table 2: Sample descriptive characteristics**

Sample characteristics	Frequency	Weighted (%)
Gender	272	100
Male	136	49.63
Female	136	50.37
Educational Qualification	272	100
High school/vocational school	32	11.8
Undergraduate	113	41.5
Masters	92	33.8
Other	35	12.9
Age	272	100
Less than 20 years	22	8.1
20-30 years	84	30.9
31-40 years	88	32.4
41-50 years	34	12.5
Above 50 years	44	16.2
Current living area	272	100
North	185	68.0
Central Region	48	17.65
Southern	39	14.35
Sector	272	100
State sector	99	36.4
Private	80	29.4
Foreign	57	21.0
Venture	36	13.2
Firm size	272	100
Less than 50 employees	35	12.9
50-99 employees	53	19.5
100-499 employees	71	26.1
500-1000 employees	35	12.9
Above 1000 employees	78	28.7

*Reliability of the scale*

The test results show that performance management & appraisal (PMA), reward & payment (RP), Employee involvement & leadership (IL), and Extra-role green behavior (EGB), Green knowledge sharing (GKS) all achieved good reliability values with Cronbach's Alpha > 0.7. However, the Green knowledge

sharing (GKS) measurement scale has the difference between Corrected Item-Total Correlation and Cronbach’s Alpha if the Item Deleted of the observed variable is significant (>0.3) leading to removing GKS5 to analysis a second time. The detail is presented in Table 3.

**Table 3: Result Cronbach’s Alpha, EFA, CFA**

Variables	Corrected Item-Total Correlation	$\alpha$ if deleted	Factor loading
Performance management & appraisal	.899		
PMA1	.787	.868	.838
PMA2	.843	.820	.950
PMA3	.778	.875	.804
Reward & payment	.770		
RP1	.562	.741	.646
RP2	.660	.631	.851
RP3	.594	.700	.689
Employee Involvement & Leadership	.789		
IL1	.720	.787	.777
IL2	.739	.769	.846
IL3	.695	.811	.788
Green Knowledge sharing	.820		
GKS1	.661	.765	.757
GKS2	.699	.751	.799
GKS3	.565	.810	.590
GKS4	.654	.768	.763
GKS5			
Extra-role green behavior	.887		
EGB1	.778	.842	.829
EGB2	.794	.828	.843
EGB3	.771	.850	.867

Source: SPSS analysis results

*Exploratory factor analysis (EFA)*

The results of the EFA show that the KMO coefficient is  $0.5 < 0.814 < 1$ , and the sig Bartlett’s Test is  $0.000 < 0.05$ . There are 5 factors extracted based on the criterion of eigenvalue greater than 1, so these 5 factors summarize the information of 16 observed variables included in EFA in the best way. The total variance explained by these 5 factors is  $64.350\% > 50\%$ , thus, the 5 factors explain 64.350 % of the data variation of 16 observed variables participating in EFA. In addition factor loadings all of the items  $> 0.5$  (Table 3). Therefore, the independent variables are suitable for aggregation.

*Confirmatory factor analysis (CFA)*

The test results show that the fit indices of the model meet the required standards:  $\text{Chi-square/df} = 1.126 < 3$  is good;  $\text{GFI} = 0.953 > 0.95$  is very good;  $\text{CFI} = 0.994 > 0.95$  is very good;  $\text{TLI} = 0.994 > 0.9$  is good;  $\text{RMSEA} = 0.022 < 0.06$  is good;  $\text{PCLOSE} = 0.997 > 0.05$  is good (Hu & Bentler, 1999). Details

are presented in Table 3 and Figure 2. Furthermore, the quality of the observed variables in the model is good and statistically significant with  $p$ -value  $< 0.05$  and factor loadings ( $\lambda$ )  $> 0.5$ . Therefore, all observed variables are suitable for SEM analysis (Hair et al., 2010).

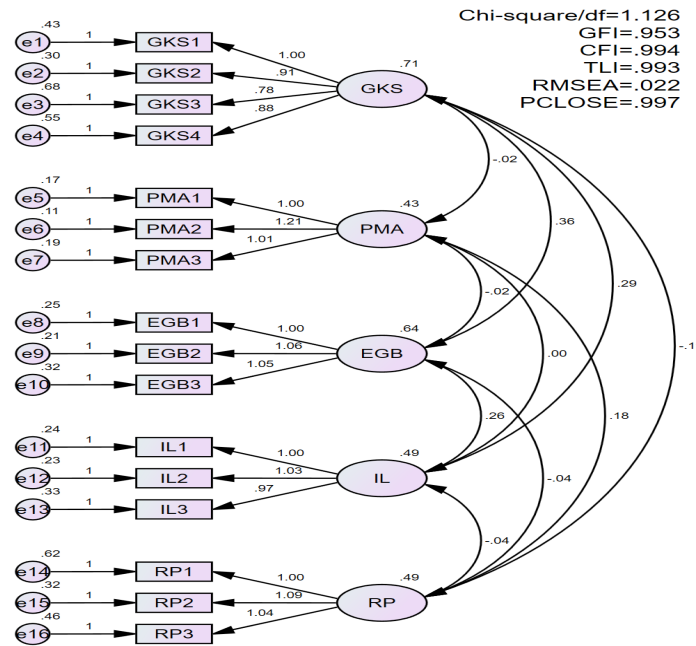


Figure 2: CFA analysis results

Source: AMOS analysis results

The average variance extracted (AVE) of all variables is  $> 0.5$ , the composite reliability (CR) is  $> 0.8$ , and the square root of AVE for each structure is higher than the correlations between structures, indicating that the reliability and validity of each measurement scale in terms of convergent and discriminant validity meet the required standards (Hair et al., 2010). Therefore, the observed variables are retained and subjected to hypothesis testing through structural equation modelling (SEM). Detailed results are presented in Table 4.

Table 4: Results of Fornell-Lacker

### Model Validity Measures

	CR	AVE	MSV	MaxR(H)	GKS	PMA	EGB	IL	RP
GKS	0.824	0.542	0.291	0.839	<b>0.736</b>				
PMA	0.901	0.753	0.155	0.914	-0.030	<b>0.868</b>			
EGB	0.888	0.725	0.291	0.890	0.540***	-0.038	<b>0.852</b>		
IL	0.850	0.653	0.244	0.853	0.494***	-0.008	0.456***	<b>0.808</b>	
RP	0.776	0.538	0.155	0.788	-0.186*	0.394***	-0.074	-0.088	<b>0.734</b>

#### Validity Concerns

No validity concerns here.

#### Structural equation modelling analysis results

The SEM test results presented in Figure 3 show that the fit indices of the model meet the required standards:  $\text{Chi-square}/df = 1.126 < 3$  is good;  $GFI = 0.953 > 0.95$  is very good;  $CFI = 0.994 > 0.95$  is very good;  $TLI = 0.994 > 0.9$  is good;  $RMSEA = 0.022 < 0.06$  is good;  $PCLOSE = 0.997 > 0.05$  is good (Hu & Bentler, 1999)

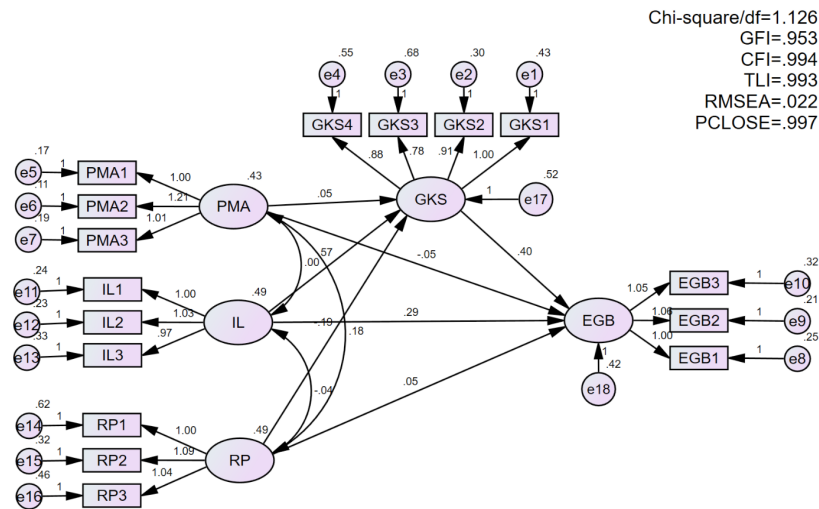


Figure 3: SEM analysis results

Source: AMOS analysis results

Table 5: Results of hypothesis testing using SEM

Variables	Hypothesis	p-value	Standardized Regression Weights	Result
PMA → EGB	H1	0.539	-0.040	Rejected
RP → EGB	H2	0.554	0.042	Rejected
IL → EGB	H3	0.000	0.251	Supported
GKS → EGB	H4	0.000	0.422	Supported
PMA → GKS	H5	0.610	0.036	Rejected
RP → GKS	H6	0.041	-0.157	Rejected
IL → GKS	H7	0.000	0.480	Supported

The results of the SEM test in Table 5 indicate that IL (p-value=0.000) and GKS (p-value=0.000) have a direct positive impact on EGB, while RP (p-value=0.554) and PMA (p-value=0.539) have no impact. Besides, IL direct impact on GKS but RP negative impact on GKS and PMA does not impact GKS. Therefore, hypotheses H3, H4, and H7 are accepted, while hypotheses H1, H2, H5, H6 are rejected. The independent variables in the research model explain 34.1% of the variance in EGB.

The indirect results show that IL and RP indirect effect on EGB through GKS. But RP has a negative effect on green knowledge sharing.

Table 6: Results of indirect relationship

Variables	p-value	Standardized Estimate	Results
RP --> GKS --> EGB	0.013	-0.066	Negative indirect
IL --> GKS --> EGB	0.001	0.203	Positive indirect

4.2. Discussion

The result shows that *Employee involvement & leadership have direct positive impact on employees’ extra-role green behavior*(p-value=0.000;β=0.251). The results of the study are similar to those of previous studies Chaudhary, 2019; Wiradirja & et al., 2020; Anwar et al., 2020; Chen et al., 2021. When employees are actively involved in environmental initiatives and decision-making processes, they develop a sense of ownership and empowerment. They feel that their opinions and contributions matter, which motivates them to go above and beyond their regular job responsibilities and engage in extra-role green behavior. Employee involvement and leadership in green initiatives can enhance job satisfaction and commitment.



When employees are actively engaged in meaningful work that aligns with their values and contributes to a greater cause, they experience a sense of fulfilment and purpose. Employees are more willing to invest their time and energy in extra-role green behavior when they feel a deep sense of connection to the cause.

*Green knowledge sharing has a direct positive impact on employees' extra-role green behavior (p-value=0.000;  $\beta=0.422$ ).* The result is similar to the research of Rubel et al., 2021. That means green knowledge sharing allows employees to access and exchange valuable information and best practices related to environmental sustainability. By sharing knowledge about green initiatives, strategies, and solutions, employees become more informed and equipped to engage in extra-role green behavior. Green knowledge sharing helps raise awareness and understanding among employees about the importance of environmental sustainability and the impact of their actions on the environment motivates employees to go beyond their job responsibilities and actively contribute to green initiatives. Green knowledge sharing fosters collaboration and encourages employees to work together to develop innovative solutions to environmental challenges and establishes social norms within the organization, where extra-role behaviors are encouraged and valued.

*Reward and payment have a direct negative impact on Green knowledge sharing (p-value=0.041;  $\beta=-0.157$ ).* While Chaudhary (2019) points out that reward & payment have direct positive impact on extra-role green behavior. This difference in results can be attributed to the fact that firms in Vietnam often use rewards & payment to prioritize short-term outcomes and achievements, such as meeting specific targets or deadlines. Green knowledge sharing, on the other hand, requires a long-term perspective and continuous learning and improvement. When reward & payment are to immediate outcomes, employees may be tied to invest time and effort in sharing and acquiring green knowledge that may not yield immediate results. This can impede the development of a sustainable knowledge-sharing culture within the organization.

Reward and payment systems primarily operate on extrinsic motivation, where individuals are motivated by external incentives such as bonuses, promotions, or salary increases. When green knowledge-sharing is solely driven by extrinsic rewards, employees may engage in knowledge-sharing activities for the sake of the reward rather than a genuine commitment to sustainability. This can lead to a superficial sharing of information without a true understanding or passion for environmental issues. In addition, reward and payment systems advantageously operate on extrinsic motivation, where individuals are motivated by external incentives such as bonuses, promotions, or salary increases. When extrinsic rewards solely drive green knowledge-sharing, employees in firms in Vietnam may engage in knowledge-sharing activities for the sake of the reward rather than a genuine commitment to sustainability. This can lead to a superficial sharing of information without a proper understanding or passion for environmental issues.

*Employee involvement & leadership has a direct positive impact on Green knowledge sharing (p-value=0.000;  $\beta=0.480$ ).* The result is similar to the research of Rubel et al., 2021, which shows that involvement & leadership – part of GHRM have direct impact on green knowledge sharing. This implies that when employees are actively involved and have high leadership, they tend to share knowledge, experience and information related to environmental sustainability. Employee involvement means active interaction and contribution to environmental sustainability-related activities, projects and initiatives within the organization. Employee leadership demonstrates their ability to motivate, inspire, and guide colleagues toward sustainable goals and values. Employees with high leadership can make a positive impact on their workgroup, encourage participation and interaction on environmental sustainability and recommend green activities and processes.

*Green knowledge sharing mediates the relationship between reward & payment and extra-role green behavior. (p-value=0.013;  $\beta=-0.066$ ).* This means that increasing green knowledge sharing of employees, reward & payment has a negative effect on extra-role green behavior. This finding highlights the importance

of recognizing the intrinsic motivations and non-monetary factors that drive employees to engage in extra-role green behavior. While reward & payment may still play a role in motivating employees, their influence is diminished when employees are already intrinsically motivated to share green knowledge and participate in environmentally responsible actions.

The statement *Green knowledge sharing mediates the relationship between employee involvement & leadership and extra-role green behavior* ( $p\text{-value}=0.000$ ;  $\beta=0.203$ ) suggests that the act of sharing green knowledge plays a mediating role in the link between employee involvement & leadership and their engagement in extra-role green behavior. In other words, when employees are actively involved in sustainable initiatives and exhibit effective leadership in promoting green practices, their engagement in sharing green knowledge acts as a mediator that influences their subsequent participation in extra-role green behavior.

## 5. CONCLUSION

Through the research process and the final report, the research team research has achieved certain tasks. *Firstly*, conducting an overview of the previously published research works in the direction of the research topic from which the authors identify research gaps to determine the research content. *Secondly*, the authors have identified independent and dependent variables, thereby forming a research model to assess the impact of human resource management measures on extra-role green behavior. *Third*, have conducted data collection using research methods such as surveys, and document analysis to collect data using statistical measures and data analysis to find out the relationship between green human resource management measures and extra-role green behavior. However, this study still has a limitation that needs to be overcome to increase the scientific and practical value of the research results.

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## IMPACT OF TOP MANAGEMENT COMMITMENT AND SELECTED HRM PRACTICES ON EMPLOYEE IN-ROLE GREEN BEHAVIOR

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**ABSTRACT:** *This study examines the influence of Top management commitment, Performance Management & Appraisal, and Employee Training on employees' green behaviors in the workplace (namely, In-role Green Behavior hereafter). The survey was conducted in Vietnam, with 1,000 invitations sent to about 50 firms from the VCCI enterprise list and received 476 responses. Our research revealed that Top Management Commitment (TMC), Performance Management & Appraisal (PMA), and Employee Training (ET) directly impact employees' In-role Green Behavior (IGB). Moreover, TMC also positively impacts PMA and ET in which the impact from TMC is the strongest, then PMA and ET with the strength of impact in the exact order respectively. In addition, this paper also found the positive mediation effects of PMA and ET on the relationship between TMC and IGB, in which PMA can transmit a better impact on TMC than ET. Overall, the impact strengths are ranked from TMC to PMA, then TMC to ET, then TMC to IGB, then PMA to IGB, then TMC to IGB via PMA, ET to IGB, and finally TMC to IGB via ET, respectively.*

*Keywords: Top management commitment, Performance Management and Appraisal, Employee Training, In-role Green Behavior.*

### 1. INTRODUCTION

As climate change becomes more and more intense, its effects will likely be profound and can have significant impacts on natural resources, leading to their reduction or alteration. Numerous scientific studies and observations support these impacts on resources. For instance, research has shown decreasing water availability in regions like the Mediterranean and parts of Africa (Xanke & Liesch, 2022), reduced crop yields in various agricultural regions, increasing forest fires in places like the Western United States and Australia (Jones et al., 2022), and coral bleaching events in the Great Barrier Reef (Datte et al., 2022) and other worldwide.

Like other organizations, any initiative, including green-related trends, must be supported by top management. TMC is the terminology that has come to the academic world's attention recently in many different fields, such as quality management, HRM, implementation of innovation, and new system... Especially in a culture like Asia, where employees are mostly "boss followers," the role of top management is vital. Top management will issue supporting policies, allocate adequate resources, conduct internal communication for implementation, etc. Therefore, it is expected that TMC will have a particular impact on employees' green behavior within the organization. Moreover, previous research in the HRM field already proves the impact of TMC on different HRM practices and HR practices in shaping employee behavior in many different aspects. Employee green behavior has been divided into employee in-role and extra-role green behavior (Aboramadan, 2022) because of the difference in the organization's expectations of their green behavior (Paillé & Boiral, 2013). Literature review shows that HR practices can initiate and accelerate in-role and extra-role behavior of employees toward more environmentally friendly practices in the workplace.

Alongside the trend of the green movement worldwide, Vietnam has also started to pay attention to research, policy, and implementation of specific environmental practices in big organizations and firms. The

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investigation to understand what factors in different HRM practices better impact employees' behavior toward green trends becomes important and has practical meaning. Due to limited time and resources, this paper can only explore HRM practices (PMA, ET) and their impacts on one dimension of employees' green behavior (IGB). To the authors' best knowledge, there is still minimal research in Vietnam on the same topic, and this paper attempts to fill in this gap and provide further empirical evidence for this literature field.

## 2. THEORETICAL FRAMEWORK

Researchers have taken notice of addressing environmental challenges by explaining how humans make their decisions to perform their behavior related to environmental problems (Klößner, 2013). Previous research has attempted to study what are some of the key drivers and processes behind the behaviors that are causing or are trying to decrease the negative impact of these environmental issues, forecast employee behavior development over time to build the foundation for strategic managers and policymakers to change the system to minimize adverse outcomes (Rayner & Morgan, 2018). Many different theories have been developed in the hope of shedding light on the underlying issue, including Value Belief Norm theory (VBN) (Stern et al., 1999; Stern, 2000), Norm activation theory (NAT) (Schwartz, 1977), Social Cognitive theory (SCT) (Bandura, 1977), theory of green purchase behavior (TGPB) (Han, 2020),...etc. These theories have been used to explain various dimensions in the green movement context (Choi et al., 2015; Han & Hyun, 2017; Phipps et al., 2013; Han, 2020). Of all the mentioned frameworks, Ability Motivation Opportunity (AMO) theory (Appelbaum et al., 2000) and Resource-Based View (RBV) are among the most popular theories, and their validity was proved in many previous HRM and behavioral topics (Boselie et al., 2005).

According to the Resource-Based View theory, each organization is believed to be a combination of numerous resources, including human, tangible (physical), and organizational resources (Barney, 1991; Teece et al., 1997; Memon et al., 2022). These resources are a historically determined collection that is attached to be the "semi-permanent" assets of the firm (Wernerfelt, 1984). This collection represents the antecedents of the firm, which managers should consider to maximize the utility and gain a competitive advantage for their organization (Wernerfelt, 1984; Lockett et al., 2014). Hence, TMC should be clear and dependable to effectively manage these unique resources that can capture the improvement of competitive advantage and imply the long-term and sustainable development of the organization (Lockett et al., 2009). Under the Resource-Based View, the managers' responsibilities are to keep the organization's strategic planning in alignment with the available resources (Lockett et al., 2009). According to this, managers must be both adaptive and proactive; in another way, they must be "enactors" (Lado & Wilson, 1994). In general, managers, specifically managers, play a vital role in coordinating central elements of the Resource-Based View. In the view of HRM, employees are considered to be one of the important resources in the organization who will be in charge of implementing all the policies and fulfilling all the objectives as set by management (Bombiak et al., 2018; Battaglia, 2018; Yuriev et al., 2020). Therefore, it is advisable for any organization to set up and pursue it (Paillé et al., 2013; Memon et al., 2022), including green behavior. In this paper, TMC is perceived as the essential driver since the top manager's commitment will ensure the organization's direction and adequate resources to support the change in the IGB of its employees.

More recently, AMO theory has been widely used to explain and constitute employees' green behavior (Rayner & Morgan, 2017). There are three important elements in AMO theory, namely Individual Abilities, Motivation, and Opportunity, that can be used to determine the high performance of employees (Appelbaum et al., 2000). To boost the performance of the firm, there are some requirements. Firstly, the employees need certain skills and abilities to perform their tasks. Secondly, motivation shall arise from employee participation in various decision-making and skill enhancement opportunities and from the view to create appropriate tasks by their managers. Since AMO theory has been considered the center of Human Resource Management (Katou & Budhwar, 2010), HRM practices constructed in line with this

theory (ability, motivation, opportunity) can form and improve individuals' discretionary behavior (Boxall & Purcell, 2003; Katou & Budhwar, 2010; Pham et al., 2019). In this paper, employee training is one of the variables included in the ability factor of AMO. Employee training provides employees with the required skills, knowledge, and attitudes to perform their related tasks (Pham et al., 2019; Jabbour et al., 2010). On the other hand, motivation in the AMO model is displayed in HRM practices via the PMA tool. The goal of such motivation is to create a suitable and inspiring system to encourage and engage employees toward the firm environmental activities (Renwick et al., 2013). Moreover, with this environmentally focused appraisal system, managers can give feedback that might help improve employees' knowledge, skills, and abilities (Masri & Jaaron, 2017), which motivates them to perform given tasks better (Govindarajulu & Daily, 2004) and withdraw some lesson-learned that might be helpful in their next environmental missions. Lastly, regarding the opportunity, TMC is considered the most vital factor in providing sufficient resources for creating a dynamic working environment toward a green prioritized atmosphere to meet their job description requirements at the best quality.

Employees' green behavior is generally pro-social (Chou, 2014; Dumont et al., 2017). With the development of the green movement, organizations have proven to have outstanding performance in terms of brand image, which in turn will further improve company sales (Wee & Quazi, 2005; Yang et al., 2011; Dumont et al., 2017) as well as trigger preferable green outcomes from their employees (Salem et al., 2012). Since the green movement can support the performance of firms from both operational and sustainable perspectives, recent organizational policies have favored the green trend. As mentioned above, this paper investigates the relationship between TMC, HRM practices, and IGB. Employee IGB is the performance of environmentally friendly activities that follow organizational or governmental policies as part of the job requirements (Norton et al., 2015; Dumont et al., 2017; Chaudhary, 2020) or job description (Borman & Motowidlo, 1997). Recently, Li et al. (2023) defined IGB as "green formal tasks that are an integral part of an employee performance assessment." Although empirical research has shown that this variable has different antecedents, such as Green Work Engagement (Aboramadan, 2022), Organizational Identification (Chaudhary, 2020), Psychological Green Climate (Li et al., 2023), etc., HRM practices are still known for its significant relationship with IGB (Aboramadan, 2022; Dumont et al., 2017; Zhang et al., 2019). More specifically, this paper will empirically test the impact of ET, PMA, and TMC on IGB.

Throughout three decades of research, the definition of ET holds some expansion, but the core part of developing competencies (Goldstein, 1980; Latham, 1988) in knowledge and skill (Kitching & Blackburn, 2002; Dessler, 2008), in capabilities (Anlesinya, 2018) and attitudes (Goldstein, 1980; Latham, 1988; Anlesinya, 2018) to safely (Dessler, 2008), effectively and efficiently (Dessler, 2008; Anlesinya, 2018) carry out their job tasks and responsibilities. With the prosperity of science and technology, ET emerges with more types and is suitable for more purposes of the organization. Recent studies have shown that ET impacts employees' green behavior. The results of these studies indicate a positive and direct relationship between ET and IGB within the scope of work (Saeed et al., 2019; Zhu et al., 2021; Karatepe et al., 2022). Multiple empirical studies have confirmed a direct positive impact of ET as a green HRM practice on environmentally friendly behavior in the workplace (IGB) in Australian multi-national companies, Chinese intermediary manufacturing companies (Dumont et al., 2017), and businesses in operational sectors of across industries (Zhang et al., 2019). Therefore, this research expects to find the same impact in this research context and proposes the following hypothesis:

*H1: ET has a direct positive impact on employee IGB.*

The keyword "performance management" began to gain prominence in the late 20th century. One of the earliest definitions of performance management showed a broad connection between setting and planning corporate goals, implementing employee development initiatives, and conducting performance



reviews and appraisals (McAfee & Champagne, 1993). Over time, performance management began to aim to improve individual and organizational performance by aligning employee efforts with strategic priorities (Tool, 2012). In this work, the authors defined this term based on the research of Armstrong (2021) as a structured approach aiming at enhancing performance at the organizational level through improving individual and team levels. It involves developing and managing performance within an established framework of predetermined goals, standards, and competency requirements.

The assessment of people's performance at work—performance appraisal—has been of interest to scholars and practitioners for literally hundreds of years (DeNisi & Murphy, 2017). Ilgen et al. (1993) defined performance appraisal as the process of assessing information and evaluating an individual's performance and productivity. This process includes three critical sets of operations which are (1) acquisition of information about those to be evaluated, (2) organization and storage of this information in memory, and (3) retrieval and integration of the information in a fashion that leads to the recording of an evaluation of the person being appraised (Feldman, 1981; Ilgen & Feldman, 1983; DeNisi et al., 1984). In addition, Fletcher (2001) believed that the focus has shifted towards evaluating past performance and enhancing employees' skills, improving performance, and allocating rewards. Nowadays, performance appraisal is considered a formal rating feedback (DeNisi & Murphy, 2017) or a formal record (Grote, 2011) of the employees' work quality (Grote, 2011) or their performance by the supervisor (DeNisi & Murphy, 2017). To sum up, performance appraisal is a systematic and formal process conducted by supervisors, managers, or human resources professionals that involves assessing, measuring, and evaluating an individual employee's job performance, productivity, and overall contribution to the organization.

In recent research, various conclusions have emerged regarding the relationship between performance management, performance appraisal, and IGB. Research findings indicate that the implementation of green PMA systems has been shown to exert an influence on employees' behavior inside the company, leading to environmentally responsible actions and practices within their job responsibilities (Dumont et al., 2017; Zhang et al., 2019; Islam et al., 2020). On the other hand, research in Malaysia by Kuan et al. (2022) did not find any impact of PMA on employees' IGB. Since there is still debate on the final impact of PMA on IGB, there exists a need to conduct further empirical research in a new research context to provide more evidence. Therefore, the following hypothesis is proposed:

*H2: PMA has a direct positive impact on employee IGB.*

Management research shows that the success of any effort targeted at changing the organization's operational philosophy has a strong connection with the TMC. Digalwar et al. (2013) stated that TMC is essential for effective environmental improvement as top management is responsible for setting up policies and communicating them thoroughly across the organization. TMC also refers to the emphasis that top managers place on developing the capabilities of an organization (Gavronski et al., 2011). In a nutshell, it represents the TMC in emotion, intention, and attitude in pursuing the organization's goals (Bagozzi, 1992), the lack of which will lead to failure to achieve these goals (Baetz & Bart, 1996). Besides, Yusliza et al. (2019) regard TMC as one of the critical organizational capabilities that assist in developing and implementing corporate environmental practices.

Implementing HRM practices within an organization requires commitment from its management team or top managers (Green et al., 2012). The same thing happens in employee training. HRM focuses on developing a state-of-the-art workforce to achieve its goals continuously. This can only be achieved through the proper and systematic implementation of employee training and development programs. Training employees on an ongoing basis is important because training familiarizes employees with their job-related duties as well as the values and beliefs of the organization (Kusluvan et al., 2010). Thus TMC is expected to have a positive

impact on ET. In addition, a well-designed PMA plays an important role in making decisions for a company’s promotion and employee development. Specifically, PMA is managers’ official assessment tool when making promotion or financial rewards decisions. Management by objective uses performance appraisal results to measure the effectiveness of workers and link it with salary or bonus increases (McKinney et al., 2013). In theory, these activities also play a role in motivating employees and raising organizational productivity levels. Given the importance of an effective performance appraisal system and managers’ clear role in company decision-making, TMC is expected to impact employee PMA positively.

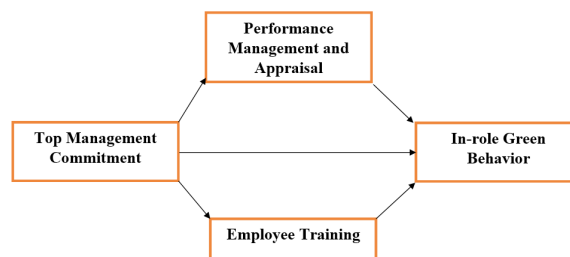
Scholar research showed little evidence about the relationship between TMC and IGB. Most available empirical research confirmed a direct positive relationship (Cairns et al., 2010; Connelly et al., 2011; Graves et al., 2019; Karatepe et al., 2022). While Cairns et al. (2010) direct relationship focused on how the strength of senior management commitment to environmental sustainability can serve as role models for other employees to act in the same way, Graves et al. (2019) proposed a positive impact of TMC on employees’ green behavior. On the other hand, the Signaling Theory (Connelly et al., 2011) proved that a manager’s commitment affects employees’ green practices. Karatepe et al. (2022) also confirmed that TMC positively affected task-related IGB.

From the above findings, this research expects to find out similar relationships and proposes to examine the following hypotheses:

*H3: TMC has a direct positive impact on employee IGB.*

*H4: TMC has a direct positive influence on ET.*

*H5: TMC has a direct positive impact on PMA.*



**Figure 1: Proposed research model**

### 3. RESEARCH METHOD

#### 3.1. Data collection and sample characteristics

The survey was conducted in Vietnam, with 1,000 invitations sent to about 50 firms from the VCCI enterprise list to meet the minimum sample size requirement. The research team asked the HR departments of agreed companies to choose at least 20 employees from their employee list to participate in the survey, using the help of a random number-picking app online.

This questionnaire used a 5-point Likert scale and was translated from English to Vietnamese using a backward translation procedure. First, the original version will be sent to a qualified translation service provider. Then, the received Vietnamese version will be sent to a researcher with a background in the same field of study to convert it back to English. This ensures that the true meaning is kept through translation. After that, a survey was sent to a pilot sample of 30 participants for comments. Several wording issues were fixed to ensure the user-friendliness of the questionnaire. The table below demonstrates the characteristics of the research sample.

**Table 1: Sample characteristics**

Sample characteristics	Quantity	Ratio (%)
Gender	476	100
Male	122	25.6
Female	354	74.4
Age group	476	100
<18	54	11.3
From 18 to 30	315	66.2
From 31 to 45	44	9.2
>45	63	13.2
Living area	476	100
North	403	84.7
Central	39	8.2
South	34	7.1
Education	476	100
<High school	67	14.1
High school	355	74.6
Intermediate/Vocational school	6	1.3
College/ University	48	10.1
Monthly Income	476	100
<5Mio	115	24.2
From 5 to 15 Mio	345	72.5
>15 Mio	16	3.4
Time	476	100
<3 years	127	26.7
From 3 to 5 years	249	52.3
>5 years	100	21.0

### 3.2. Scales' measurement

This research uses items inherited from previous studies and adapted to fit the context of Vietnam. These scales were selected from published studies in reputable academic journals with a high volume of citations, which proves the support of later scholars to the original studies. Some studies were also conducted in developing countries such as Mexico (Jun et al., 2006) and China (Muisyo & Qin, 2021), thus having similar characteristics to Vietnam that would help the questionnaire. Table 2 below illustrates the sources of inheritance.

**Table 2: The inherited scales**

No	Variable name	No of items	Inherited from
1	Performance Management and Appraisal	3	Muisyo & Qin (2021)
2	Top Management Commitment	3	Jun et al. (2006)
3	In-role green behavior	3	Bissing-Olson et al. (2013)
4	Employee Training	3	Muisyo & Qin (2021)

### 3.3. Analysis

The data is collected and processed using SPSS and AMOS. In order to test the reliability of the measurement scales, Cronbach’s Alpha ( $\alpha > 0.7$ ) and Corrected Item-Total Correlation ( $> 0.3$ ). Then EFA and CFA are run to test the discriminant and convergent validity of the variables. Finally, the structural equation model (SEM) explores the relationships between model variables and concludes the hypotheses.

**4. RESULTS AND DISCUSSION**

**4.1. Results**

Scales’ ET, PMA, TMC, and IGB reliability are demonstrated in the table below. Research results indicated that all scales achieved acceptable thresholds because they have Cronbach’s Alpha (CA)  $> 0.8$  and Corrected Item-Total Correlation (CI-TC)  $> 0.3$ .

**Table 3: Reliability test**

Variables	CI-TC	CA if deleted	Factor loading
Employee Training	0.825		
ET1	.640	.805	0.698
ET2	.740	.704	0.923
ET3	.672	.769	0.736
Performance Management & Appraisal	0.926		
PMA1	.842	.897	0.844
PMA2	.866	.878	0.950
PMA3	.837	.901	0.754
Top Management Commitment	0.879		
TMC1	.771	.824	0.769
TMC2	.768	.829	0.934
TMC3	.763	.833	0.612
In-role Green Behavior	0.939		
IGB1	.886	.903	0.926
IGB2	.891	.899	0.977
IGB3	.846	.933	0.818

EFA was run with Principal Axis Factoring and Promax to test the construct validity between the model’s variables. Results show that KMO is  $0 < 0.908 < 1$ ; Bartlett’s sig. is  $0.000 < 0.05$ ; Total Variance Explained is  $75.203\% > 50\%$ , and Factor loadings are all greater than the acceptable threshold of 0.5 (Hair et al., 2009).

**Table 4: CFA results for convergent and discriminant validity**

Variables	CR	P value	$\beta$
CMIN/DF	2.835		
GFI	0.954		
CFI	0.981		
TLI	0.974		
RMSEA	0.062		
PCLOSE	0.050		
IGB1 <- IGB	0.940	0.000	0.930
IGB2 <- IGB		0.000	0.934
IGB3 <- IGB		0.000	0.884

PMA1 <- PMA	0.926	0.000	0.888
PMA2 <- PMA		0.000	0.913
PMA3 <- PMA		0.000	0.893
TMC1 <- TMC	0.877	0.000	0.828
TMC2 <- TMC		0.000	0.806
TMC3 <- TMC		0.000	0.882
ET1 <- ET	0.831	0.000	0.723
ET2 <- ET		0.000	0.852
ET3 <- ET		0.000	0.787

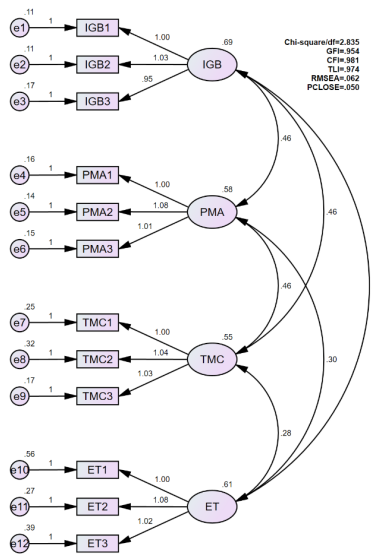


Figure 2: CFA result

Consequently, all items were retained for the subsequent analysis of CFA. The model fit met all requirements, reliability was confirmed again by CR, the p-value of almost all items is  $0.000 < 0.05$ , and factor loading rounded up achieved the minimum threshold of 0.5, which confirms the discriminant and convergence of the model’s items. The Fornell and Lacker results were tested using the Validity plugin in AMOS and showed no validity concerns.

	CR	AVE	MSV	MaxR(H)	IGB	PMA	TMC	ET
<b>IGB</b>	0.940	0.840	0.550	0.944	<b>0.916</b>			
<b>PMA</b>	0.926	0.807	0.668	0.927	0.727***	<b>0.898</b>		
<b>TMC</b>	0.877	0.704	0.668	0.883	0.742***	0.817***	<b>0.839</b>	
<b>ET</b>	0.831	0.622	0.257	0.843	0.507***	0.506***	0.479***	<b>0.789</b>

**Validity Concerns**

No validity concerns here.

**References**

Significance of Correlations:

- † p < 0.100
- \* p < 0.050
- \*\* p < 0.010
- \*\*\* p < 0.001

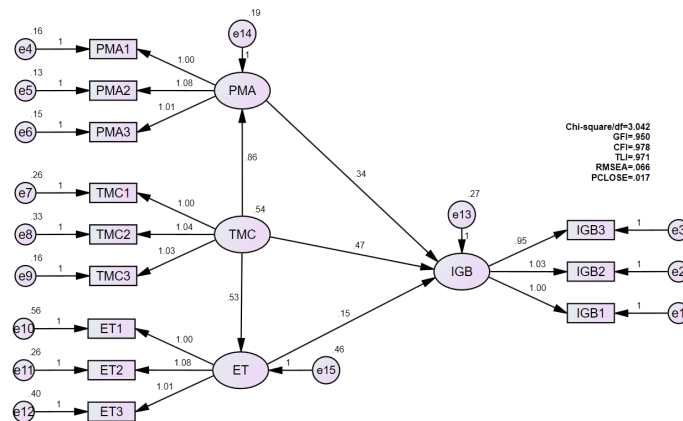
Figure 3: Fornell Lacker validity test

SEM analysis was conducted to test the model fit and the hypotheses. Results showed that the path coefficient from TMC to both PMA and ET is significant as a p-value <0.05. Similarly, TMC, PMA, and ET all have positive relationships with IGB (-value <0.05).

**Table 5: SEM for hypothesis testing**

Variables	Status	P value	$\beta$
CMIN/DF		3.042	
GFI		0.950	
CFI		0.978	
TLI		0.971	
RMSEA		0.066	
PCLOSE		0.017	
IGB <- ET	Accept	0.000	0.143
IGB<- PMA	Accept	0.000	0.310
IGB<-TMC	Accept	0.000	0.422
ET<TMC	Accept	0.000	0.504
PMA <- TMC	Accept	0.000	0.826
IGB<- PMA <- TMC	Accept	0.001	0.256
IGB <- ET <- TMC	Accept	0.001	0.072
R <sup>2</sup>			
IGB		0.610	

More specifically, the strength of these relationships rank from TMC to PMA ( $\beta=0.826$ ), TMC to ET ( $\beta=0.504$ ), TMC to IGB ( $\beta=0.422$ ), PMA to IGB ( $\beta=0.310$ ), and finally ET to IGB ( $\beta=0.143$ ). The independent variables can explain roughly 61% of the variance in IGB. All proposed hypotheses are supported in this case.



**Figure 3: SEM results**

The indirect relationships were tested using the Indirect Effect plugin in AMOS. Results showed that PMA has a mediating effect on the relationship between TMC and IGB (P-value< 0.05), and ET has a mediating effect on the relationship between TMC and IGB (P-value< 0.05). Besides, both PMA ( $\beta=0.288$ ) and ET ( $\beta=0.081$ ) have a positive mediate role, enhancing the relationship between TMC and IGB. Last but not least, PMA made a more significant indirect impact than ET.

**4.2. Discussion**

The research results show a direct positive relationship between ET and IGB. This result aligns with previous studies (Chaudhary, 2019, 2020; Goswami & Upadhyay, 2020). In addition, according to our results, PMA also makes a direct positive impact on IGB, which is also similar to the research of Zhang et al. (2019),

Chaudhary (2020), and Pham et al. (2020). The results of this paper emphasize that PMA plays an essential role in shaping employee IGB. Furthermore, the authors find out that TMC not only has a direct positive effect on ET (Yusliza et al., 2019; Memon et al., 2022; Haldorai et al., 2022) but also directly impacts PMA (Yusliza et al., 2019; Haldorai et al., 2022). Research results also show that TMC positively influences IGB. These results highlight the importance of TMC in shaping HRM practices and promoting environmentally friendly employee behavior. Some previous studies have also proven this view (Graves et al., 2019; Karatepe et al., 2022).

The fact that these findings have met the research team's expectations demonstrated in our hypotheses shows that the Vietnamese context and the view of organizations doing business in Vietnam have been quite in line with international practice. Vietnam has dealt with many environmental problems lately, as people have been severely depleted of natural resources. This condition has occurred due to the lack of people awareness and appropriate policy. After some initial suffering from the damage of biodiversity loss and understanding how sustainable development can positively enhance firms' benefits in particular and social welfare in general, Organizations and policymakers have recognized the necessary demand in building up well-structured training programs closely attached to green orientation. Therefore, employees in the organization can perceive the value of going green and accompany their organization to fetch sustainable development. In addition, the performance management and appraisal system are proven to have a certain positive impact on motivating employees to follow those green behaviors that are required by the extent of the job description. This practice's more substantial impact can be explained by the Vietnamese government encouraging companies to develop based on sustainable orientation. For instance, Vietnamese Communist Party Congress Resolution 4<sup>th</sup> has been approved by the Vietnamese National Assembly, states that government and state governors have to "Support key and focal businesses, anticipating new business trends; developing new business models based on innovation, digital economy, sharing economy, circular economy, green economy, and sustainable business; promoting the formation of leading enterprises in potential industries and fields to create new growth momentum and achieve sustainable goals." According to this, the performance management and appraisal for IGB of employees need to be closely coordinated with the reality of the organization and correctly perform the green behavior of employees. Also, top management commitment is undoubtedly vital in beginning the effort of going towards green orientation in the organization and connecting every practice to gain desired outcomes.

Theoretical implications of the study include integrating the Resource-Based View theory and the Ability Motivation Opportunity theory in explaining the relationships between TMC, selected HRM practices (PMA, ET), and IGB. The study provides empirical evidence for the direct effects of TMC, PMA, and ET on IGB. Additionally, the study demonstrates the mediation effects of PMA and ET on the relationship between TMC and IGB. The study's practical implications suggest that organizations should emphasize TMC towards environmental sustainability and incorporate green HRM practices into their human resource strategies. The urge to become committed starts with awareness of the positive outcomes and impact of constructing green employee behavior. Organizations should maintain, provide and further extend training programs to equip employees with the necessary knowledge and skills for environmentally friendly behavior. PMA systems should also be designed to encourage and recognize IGB at the right time, at the right place, and to the right person. By implementing these practices, organizations can foster a culture of sustainability and promote employees' engagement in green activities, eventually gaining benefits from it. On the other hand, the government needs to encourage people and organizations further to develop sustainably by passing policies that raise awareness and instruct how organizations simultaneously achieve their environmental and business goals.

This current study has some existing limitations and would like to address certain directions for future research. *Firstly*, the present study only researched several HRM practices and their impacts on IGB due to a scarcity of time and resources. Therefore, the study suggests the scope of future studies to focus on more practices of HRM such as reward and payment, recruitment and selection, employee engagement, etc. *Secondly*, the surveyed respondents mainly live in the northern region of Vietnam. Hence, future research could develop and expand surveys nationwide. *Thirdly*, this paper mainly focuses on IGB, limits the general understanding of employees' green behavior only, and does not examine its remaining dimension – extra-role green behavior. Future researchers can further extend their research to gain more comprehensive knowledge about how different HRM practices impact each dimension and propose more valuable suggestions to organizations to build up suitable policies in a green context.

## 5. CONCLUSION

This research paper aims to test the relationship between selected HRM practices and IGB, using AMO theory and Resource-Based View theory to build the theoretical framework. After analyzing 476 responses, the research found that TMC, PMA, and ET have a positive direct relationship with IGB. Moreover, TMC also positively impacts ET and PMA. According to these results, some suggestions were made for organizations and governments to improve the green behavioral outcomes of employees. As the independent variables in this study can only explain 61% of the IGB variance, other impact factors were not included in this research. Future studies in the same field can further expand this research to deepen the underlying issue's meaning and comprehension.

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## THE EFFECTS OF BLOCKCHAIN TECHNOLOGY ON FOOD - PURCHASING INTENTIONS OF CONSUMERS IN HANOI OF VIETNAM

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**ABSTRACT:** *In the 21st century, food-related issues have been a topic of interest among consumers worldwide. In this regard, blockchain has emerged as a promising technology that allows users to track and monitor food through the supply network, ensuring its origin. This study explores factors such as Blockchain's traceability, product quality, supply chain transparency, safety, anti-counterfeiting, trust, perceived usefulness, and perceived risk are all positively related to purchase intentions in Hanoi, Vietnam. After in-depth interviews, the authors have found that these factors directly or indirectly encourage consumers to purchase food products in the surveyed area.*

**Keywords:** *Blockchain features in the buying process, consumer awareness, purchase intention..*

### 1. INTRODUCTION

In recent years, the safety and quality of food products has become the dominating concern of the whole society. An estimated 600 million – almost 1 in 10 people in the world – fall ill after eating contaminated food and 420 000 die every year, resulting in the loss of 33 million healthy life years (DALYs) (World Health Organization 2022). This directly puts enormous pressures and challenges on the global food market such as the enforcement of bans on unhealthy foods, plastics, the pervasiveness of e-commerce, and the transfer of advanced technologies. Additionally, there is an increasing demand in the food sector to collect and share substantial volumes of data to ensure the reliability and trustworthiness of the supply chain. Moreover, customers have become progressively more demanding when it comes to the quality and safety of food items. In this regard, blockchain has emerged as a promising technology that allows users to effectively and efficiently track and trace the sources of foods from food retailers and mitigate or even eliminate harmful food fraud. For instance, Walmart has successfully started using Blockchain to trace the import process of pork from China. With the support, Walmart understands the manufacturing, logistics, storing as well as transacting processes of any products.

From now, there are numerous studies on the effect of Blockchain on purchasing intention in countries around the world. In the context of developing countries such as VietNam, however, there are no studies that put emphasis on the effects of Blockchain on food-related areas. Therefore, the aim of this paper is to identify Blockchain factors affecting consumers' intention to purchase food products in Hanoi through in-depth interviews. In this study, we will investigate three main points: (i) review the Stimulus-Organism-Response (S-O-R) Model; (ii) develop a research framework for purchasing intention; (iii) determine the impact of factors that affect purchasing intention of consumers.

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## 2. LITERATURE REVIEW

### 2.1. The Stimulus-Organism-Response (S-O-R) Model

The SOR model is employed as the conceptual foundation for this study. It suggests that various aspects of the environment (S), such as physical and nonphysical elements of the food - related field, can affect peoples' internal states and organismic experiences (O), such as perceptual, physiological, feeling, and thinking activities, which in turn drive their behavioral responses (R), such as satisfaction, patronage, intention, number of items purchased, and amount of money spent in the store (Mehrabian and Russell, 1974).

Stimuli (S), according to Lin and Lo (2016) refers to the influencing factor of the external environment which can affect the mental and cognitive state of the organism. In this study, we adopt some factors, including Traceability, Food quality, Supply chain transparency, Safety, and Anti-Counterfeiting. In the study of Gotel and Finkelstein (1994), traceability is defined as “the ability to describe and follow the life of a requirement, in both a forwards and backwards direction”.

Organism (O) refers to the internal processes and structures that intervene between external stimuli and final actions, reactions, or responses emitted by individuals, “which consist of perceptual, physiological, feeling, and thinking activities” (Bagozzi, 1986). This study adopts few notions, namely perceived usefulness, perceived risk and trust, to demonstrate customers' internal processes.

Our study considers Food-purchasing Intention as the response (R) to the stimulus and organism discussed in the preceding section. It is associated with customers' behavioral reactions, often termed a “behavioral intention.” Purchase intention is defined as the likelihood of a consumer to purchase a service or product in the future (Richardson et al., 1996). We, in this study, adopt the argument of Halji (2014), which states that purchase intention can be used to anticipate a customer's possible actions. Therefore, our research model indicates food-purchasing intention as the response to describe consumers' intentions to buy food in relation to Blockchain traceability.

### 2.2. Development of hypotheses

#### 2.2.1. Blockchain feature in Buying process (S)

Food safety and quality assurance has become increasingly difficult in times of growing global flows of goods (Creydt and Fischer, 2019). Moreover, with increased quality of life, food consumers are highly concerned not only about the taste of food but also quality, cleanliness and authenticity (George et al., 2019). Correspondingly, the demand for traceability has been increased due to food-related safety hazards and scares (Opara, 2003). This drives organizations to adapt the latest technologies in the quality control systems which ensures traceability right from post-harvest to serve consumers with the maximum value addition possible. According to George *et al.* (2019), the potential value of the index of food quality as a nutrition education tool for the public will be realized only when food profiles are readily available. In addition, the adoption of food traceability systems enables companies to ensure food safety through early detection of deficiencies, and to efficiently withdraw and reduce the volume of unsafe products on the market (Kher *et al.*, 2010; Thakur *et al.*, 2010). A typical example of implementing Blockchain's traceability is Walmart which ensures food safety for products like pork and mango by capturing data from various nodes, starting from the farm, packing house, and transportation to the final consumer. Thus, we hypothesize the following:

#### **H1: Blockchain's traceability exert a positive influence on food quality**

In the context of supply chain management, two terms “Transparency” and “traceability” are wrongly used interchangeably. Supply chain transparency is the practice of disclosing detailed and accurate

information about operations and products, such as their origin and sourcing, manufacturing processes, costs, and logistics (Bai and Sarkis, 2020). However, Sunny *et al.* (2020) proposed that traceability represents the ability to access the granular level information about anything that remains as part of a supply chain. Traceability capabilities allow the observability of supply chain processes (Ringsberg, 2014) and provide insights into the origin, authenticity, chain of custody, and integrity of market offerings (Marucheck et al., 2011). As such, effective and efficient traceability capabilities are essential operational vehicles of supply chain transparency due to their critical role in establishing provenance (Sodhi and Tang, 2019). Sunny *et al.* (2020) suggested that several researchers have incorporated traceability in various supply chain scenarios in order to erect transparency. For example, Kandel *et al.* (2011) presented a Global Positioning System (GPS) enabled traceability system called GPS.LAB to perform tracing and tracking in the context of production planning and supply chain event management to establish transparency in global supply chains. In short, traceability enables transparency through tracing and tracking. Therefore, a following hypothesis is drawn:

### **H2: Blockchain's traceability exert a positive influence on supply chain transparency**

The problem of counterfeit product trading is one of the major challenges in an innovation-driven global economy which also pose broader adverse effects to the economy, public health, safety, and security of the wider community. In order to overcome the issue of counterfeiting, an effective supply chain traceability system is necessary (Gayialis *et al.*, 2022). According to the author, If a product is found to be faulty, the traceability system gives all of the information essential to conduct a successful recall of the problematic product or batch. Thus, it serves as a solution for ensuring the security and sustainability of businesses, their rapid reaction in times of crisis, their protection from malicious activities, and the overall improvement of operations via the discovery of root causes. Aitzhan and Svetinovic (2016) argued that the combination of data tampering and transaction traceability on blockchain can solve the problem of trust in traditional traceability, effectively solve the problem of fake and inferior products during the product circulation process in the supply chain, and protect the rights and interests of consumers. Therefore, implementing Blockchain's traceability features not only track the origin of goods but also identify counterfeiting products, fake transactions... Thus, we put forward a hypothesis:

### **H3: Blockchain's traceability exert a positive influence on safety and anti-counterfeiting**

It has been recognised that there is an increasing need for transparent information on the quality of the entire food chain, supported by modern tracking and tracing methods (Trienekens and Beulens, 2001). Trienekens *et al.* (2012) posited that transparency in the food supply chain is essential to guarantee food quality and provenance to all users of food and food products. Due to recent food crises, product and process quality and safety have become paramount - alongside efficiency - (Babuchowski *et al.*, 2005; Aramyan *et al.*, 2006) and, thus, can be used as indicators of chain performance for measuring the effects of transparency.

In addition, supply chain transparency plays a vital role in verifying counterfeiting products. Certain industries, such as the seafood industry, are vulnerable to fraud, where lesser value fish are commonly labeled and sold at higher value (Astill et al., 2019). Oceana reported that 44% of sampled seafood products from Canadian retail and restaurant locations were mislabelled (Oceana Canada, 2018). This leads to many concerns over the accuracy of properly labeled seafood, as many different species of fish can be grouped under one label, leaving consumers with very little confidence about the veracity of seafood products (Levin, 2018). Therefore, by increasing the transparency of the operations that go into food production, consumers can avoid purchasing fake products, poor quality goods due to the wealth of new data and information, underpinned by evolving technologies that have and will become available. With these considerations, the following hypotheses are proposed:

**H4: Supply chain transparency is positively related to product quality.**

**H5: Supply chain transparency is positively related to safety and anti-counterfeiting.**

### **2.2.2. Influences of Blockchain features (S) on Consumer awareness (O)**

Consumers can access information about the value of food products. This is related to a trade-off in terms of perceived usefulness between quality/benefit and cost/price (Kervenoael et al., 2021). According to the study of Jamal and Sharifuddin (2015), developing advertisement messages that encourage consumers to think about the quality of the halal logo products. These messages can highlight the usefulness of a halal logo by using an advertising format that describes how the logo resolves a typical problem in shopping for halal food products. Additionally, food quality is often presented on the food label. According to Festila *et al.* (2014), food labels served as a versatile tool that helps manufacturers promote and communicate certain qualities of the food products, including nutritional composition, process-related features (such as organic, and traditional), and other relevant information. The increasing presence of a wide range of quality differentiated food (such as healthy, organic, environmental friendly, ...) in the market has helped consumers with more information, then increase their perceived usefulness. Consequently, we put forward a hypothesis:

**H6: Product quality has a positive influence on the perceived usefulness of consumers.**

The absence of transparency in the supply chain of any product prevents supply chain participants and consumers from verifying and validating the actual value of that product (Saberri et al., 2019). Blockchain technology enhances supply chain transparency, enabling supply chain managers to obtain the information that consumers are demanding (Francisco and Swanson, 2018). Supply chain transparency builds trust between consumers and other supply chain participants. This trust contributes to higher perceived usefulness of the product as consumers believe it will effectively fulfill their needs. Supply chain transparency allows consumers to understand the impacts and outcomes of a decision on a product and to promote a better understanding of environmental conditions (Abeyratne and Monfared, 2016). According to Wang *et al.* (2019), Blockchain technology improves supply chain transparency by enabling the development of services like track and trace, Blockchain diminishes the necessity for double-checking as data validation is automated. Additionally, Blockchain technology enables transaction tracing, thereby providing evidence of the origin and authenticity of transactions. As a result, we propose a hypothesis:

**H7: Supply chain transparency has a positive influence on the perceived usefulness of consumers.**

Companies can positively shape the perceived usefulness of consumers by giving priority to safety and anti-counterfeiting measures. Therefore, they influence consumers' perception of the value and usefulness of the products. Blockchain technology has the characteristics: distributed ledgers, data security, anti-counterfeiting, and programmable features... increase flexibility and reliability across various application scenarios (Zhu and Zhou, 2016). In addition, Zhu and Zhou (2016) indicated that Blockchain technology enables a decentralized ledger system, providing data security, transparency, and integrity. Moreover, it offers anti-tampering and anti-counterfeiting characteristics. Thus, it helps platforms to earn consumers' trust and makes themselves a reliable third-party institution. Based on numerous studies (Cranor et al., 2000; Westin and Maurici, 2007; Agarwal et al, 2009...), with the rapid expansion of online products and services, consumers are becoming progressively more apprehensive about security and privacy issues. Therefore, we put forward a hypothesis:

**H8: Safety and anti-counterfeiting have a positive influence on the perceived usefulness of consumers.**

According to Wang *et al.* (2020), numerous food product scandals have erupted in China and have since remained in the spotlight in both local and international societies. As a consequence, trust in the



Chinese food industry has plummeted, and consumers have little confidence in the quality of food products produced or manufactured in China. Jimenez and Martin (2010) mention, trust can be formed by the image of products based on the country of origin of products and also the knowledge of the product or brand. Furthermore, Haslinda et al., (2014), suggest that the indicator of consumer confidence in product COO, are:(1)Consumers trust the quality of the brand products; (2)Reputation of brand is reliable. In addition to the above dimensions, the country of origin of products and technology are the attributes of the product quality perception COO considered by consumers when deciding to purchase a product (Han, 1990). Thus, we hypothesize the following:

**H9: Product quality has a positive influence on the trust of consumers.**

Consumer perception of transparency was a strong factor that positively influenced trust and in addition, general attitude. The results thus suggest that the level of a company's transparency, as perceived by a consumer, can play a valid and significant role in building trust and a positive attitude toward the company. (Kang and Hustvedt 2014). In addition, Francisco and Swanson (2018) indicated that consumers' expectations regarding product origins are continuously increasing, especially for high-value items such as food. According to Ward (2017), pioneering companies recognized the competitive advantage of supply chain transparency, which led to increasing the consumer's trust, and increased purchasing and financial benefits for these companies. Furthermore, consumers often lack awareness of the numerous issues associated with the production of goods. The incidents such as environmental damage, generation of waste at the end of product life, unethical labor, and counterfeit products,... have heightened the demand for transparency in manufacturing supply chains as a means of regaining consumers' trust in products (Abeyratne and Monfared, 2016). Thus, we hypothesized:

**H10: Supply chain transparency has a positive influence on the trust of consumers.**

The importance of farmers building trust has become critical in light of recent concerns about food safety in food consumption (Yee et al 2012). According to a consumer survey conducted by the Institute of Grocery and Distribution (IGD), only 10 percent of respondents expressed trust in farmers (Grocer, 2000). Consumers might develop trust in livestock farmers if their demonstrated competence increased, reflected in their capability to supply livestock free from health hazards throughout the supply chain. (Moorman et al., 1993; Smith and Barclay, 1997). This competence is evident in their provision of safe and clean raw meat and their accurate guidance on food safety. Additionally, there is an inverse relationship between trust and food risks, meaning that individuals who have a greater level of trust in the food system tend to be less concerned about potential risks, and conversely, those who have lower levels of trust may exhibit higher levels of concern regarding food risks (Knight and Warland, 2005). Based on prior research investigations, we hypothesize:

**H11: Safety and anti-counterfeiting have a positive influence on the trust of consumers.**

Transparency can reduce information asymmetry among parties involved in the transaction (Nuengwang et al 2013). The act of seeking information and the utilization of traceability systems are closely linked to transparency. This connection is evident in the findings of Yoo *et al.* (2015), who observed that when consumers perceive a risk, they are motivated to proactively seek additional information. This pursuit of information is facilitated by transparency, which allows consumers to access and evaluate relevant data through traceability systems. Thus, transparency serves as a fundamental factor in enabling and supporting the process of seeking information and utilizing traceability systems in response to perceived risks (Yoo et al., 2015).

Perceived transparency is expected to alleviate the information asymmetry between the users (principal) and a website (agent) (Wang et al 2007), thereby reducing their perceived risk. Information transparency in the supply chain is an effective approach to mitigate information asymmetry between the principal and the agent, thereby reducing consumers' perceived risk and increasing their intention to purchase. Given that transparency enhanced consumers' purchase intention by directly providing them with information benefits (i.e., reduce search cost and increase search efficiency) or by indirectly helping them reduce potential losses/risks (i.e., risk of purchasing a dysfunctional product or transacting with a fraudulent trader) (Zhou et al 2018). On the basis of these reasons, the following hypothesis is proposed:

**H12: Supply chain transparency reduces the perceived risk of consumers.**

Safety and anti-counterfeiting measures focus on maintaining food safety standards and preventing unauthorized alterations or frauds. Risks related to food fraud are for the most part low probability and high impact and characterized by a lack of controllability by individuals. During the process of transitioning to an information society, it has been observed that consumers have become more conscious of their purchase attitudes. Therefore, in addition to the above-mentioned factors, well-informed and conscious consumers tend to develop their own risk-mitigation process for purchase activities of goods and services (Köprülü, 2013). This indicates that consumers' perception of risk is significantly influenced by the implementation of safety practices. Yeung and Morris (2001) suggest that as the concern about food safety is growing, the demand for problematic food falls as consumers perceive a risk impact on their health. Therefore, when food is unequivocally established as safe, consumers can confidently make their purchases. Thus, we make a hypothesis:

**H13: Safety and anti-counterfeiting reduces the perceived risk of consumers.**

**2.2.3. Influences of Blockchain features (S) and Consumer awareness (O) on Intention (R)**

Consumer risk perceptions evolved from the consumer beliefs concerning complexity and unpleasant events that may occur during the online purchase scenarios (Tham et al., 2019). However, trust can play an essential role in mitigating the impact of risks that are associated with the consumer's perception of risk. (Pappas, 2016). When consumers perceive financial risks, such as the possibility of fraudulent transactions or financial losses, time risks, such as delays in delivery or inconvenience, and psychological risks, it undermines their trust in sellers. These perceived risks create doubts and uncertainties, eroding the confidence consumers have in the reliability and credibility of the online seller. (Munikrishnan et al., 2023). After considering those analyses, we propose a hypothesis:

**H14: The perceived risk has a negative influence on the trust of consumers.**

Perceived usefulness has significantly influenced consumers' overall intention to purchase, besides being positively related to consumers' behavior and attitude (Monica et al., 2016). According to Nedra *et al.* (2019), consumers are more likely to consider making a purchase when they perceive a specific system as useful to them. In other words, when a technological innovation provides benefits to the clients, perceived usefulness can generate purchase intention. As stated by Mazzini *et al.* (2016), perceived usefulness refers to users' convictions that utilizing a medium, such as the Internet, a website, or an app, will enhance their performance and productivity, in addition to boosting their satisfaction and improving their overall experience. In addition, consumer satisfaction has been found to have a direct effect on buying intention (e.g. Yi, 1990; Bou-Llusar et al., 2001; Yi and La, 2004; Tsiotsou, 2006). Specifically, in the context of food products, various authors have discovered a positive impact of consumer satisfaction on buying intention (e.g. Mai and Ness, 2000; Calvo, 2001; Hansen and Solgaard, 2001; Sanzo et al., 2003; Grunert et al., 2004; Nowak and Newton, 2006). Hence, we propose following hypothesis:

**H15: The perceived usefulness of consumers has a positive influence on the intention of purchasing food from consumers.**

Blockchain adoption process of traceability raises awareness among consumers, leading to their trust in food products which are purchased. Trust is one of the most effective methods of reducing consumer uncertainty (Hart and Saunders, 1997). Wang et al (2020) indicated that consumers hold different levels of trust in different labels, depending on the food certifying body, and that international bodies receive the highest confidence level, influencing the total purchase intention of certified food. In the context of liquid milk (Hoque and Alam, 2018) and organic food (Nuttavuthisit and Thøgersen, 2017; Teng and Wang, 2015), it is projected that trust will signify the consumers- attitudes and purchase intentions. Thus, the consumers - perspectives on trustworthiness are likely to determine the final purchase decision between a buyer and a seller (Gupta et al., 2009). We accordingly proposed a reasonable hypothesis:

**H16: The trust of consumers has a positive influence on the intention of purchasing food from consumers.**

Several studies suggest that the risk perception with regard to food can strongly impact purchase intention (Klerck and Sweeney, 2007; McCarthy and Henson, 2005; Tsiros and Heilman, 2005; Park et al., 2005). In addition, Ariff et al (2014) asserted perceived risk is significantly associated with a customer's purchase intention. Nok et al (2017) revealed the negative relationship between perceived risk and buying intention, implying that an enterprise should reduce the perceived risk of products and boost consumer trust of products to enhance the purchase intention. According to Jun (2020), risk perception has been suggested as one of the most significant determinants of consumer buying intention. Chen *et al.* (2016) stated that the more perceived risk of consumers would reduce the purchase possibility; consumers would reduce risks by collecting information before buying. Therefore, we hypothesize that:

**H17: The perceived risk of consumers has a negative influence on the intention of purchasing food from consumers.**

Product quality plays a significant role in influencing a consumer's intention to purchase food. Consumers often associate high-quality products with superior taste, safety, and nutritional value. As such, they are willing to pay more for these products and are more likely to purchase them repeatedly. Iskandar et al (2015) concluded that product quality acting as a satisfaction component variable would significantly lead consumers to a higher propensity for purchases. With regard to organic food, Basha et al (2015) argued that quality of products is one of the most commonly stated motives for pursuing this kind of food. According to Saleem et al (2015), if the quality is high, the purchase intention of the customer is also high. Moreover, consumers engage in purchase by taking into account the quality signals they encounter (Iyer and Kuksov, 2010)). In other words, consumer-perceived product quality plays a significant role in shaping attitudes and buying intentions (Lin et al., 2009). Therefore, a following hypothesis is drawn:

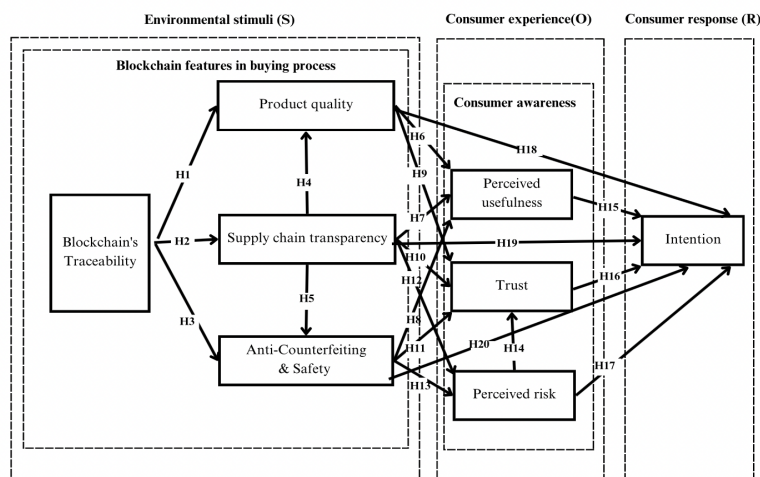
**H18: Product quality has a positive influence on the intention of purchasing food from consumers.**

When consumers have access to information about where their food comes from, how it was produced, and how it was transported, they are more likely to trust the brand and form purchase intentions. Francisco and Swanson, (2018) stated that the supply chain concept of transparency embodies, basically the idea of information readily available to end-users and firms in a supply chain, positively impacts the consumer intentions. The presence of a blockchain label on a product as an evidence of supply chain transparency increases a consumer's propensity to purchase it (Gazzola et al., 2023). Mollenkopf et al (2022) revealed that the signal of supply chain transparency exhibits higher attraction to consumers in buying intention. Thus, boosting consumer intention to purchase food - related products calls for promoting supply chain transparency. We propose a following hypothesis:

**H19: Supply chain transparency has a positive influence on the intention of purchasing food from consumers.**

Safety and anti-counterfeiting are crucial factors for consumers when choosing which products to buy, especially in the food industry. The presence of such elements builds trust between consumers and food manufacturers, which can lead to an increase in purchase intention. Lee and Yun (2015) investigated how consumers perceive organic food attributes including food safety, which in turn influence their attitudes and intentions to buy. According to Sans (2018), there are numerous cases regarding food frauds that have had major social impact, such as the marketing of more eggs sold as free range than there is the capacity to produce, of organic products that are not organic, of animal or plant species labeled as other species, or nuts with a false origin. In addition, wines have been found to be labeled with inaccurate ratings, or have unauthorized flavorings added to them without proper disclosure. Additionally, mechanically separated meat has been observed to be sold without proper declaration, and olive oil is marketed as extra virgin even when it fails to meet the requisite standards. The lack of food fraud control leads to a loss of trust in the food industry among consumers, consequently affecting their intention to buy food. Since Blockchain traceability features including ensuring and enhancing food safety, quickly detecting and solving food fraud, we make a hypothesis that:

**H20: Safety and anti-counterfeiting have a positive influence on the intention of purchasing food from consumers.**



**Figure 1. The effect of Blockchain technology on Purchasing intention research model**

### 3. RESEARCH METHOD

The group of authors utilized a qualitative approach - in-depth interviews to examine the relevance of factors in the research model applied in the context of Vietnam. The participants involved in the in-depth interviews were food consumers in Hanoi, Vietnam, encompassing diverse demographic characteristics in order to achieve the research objectives as follows:

Firstly, the study explored the current status of Blockchain-related factors influencing consumers' intention to purchase food (characteristics of Blockchain, features related to the purchasing process, consumer perception). Secondly, the study investigated the relevance of these factors and the interplay among them in the overall model. The group of authors conducted in-depth interviews with 18 individuals with different demographic characteristics (age, gender, occupation, average monthly income).

The qualitative research using in-depth interviews was conducted over a span of approximately one week, from May 8th, 2023, to May 14st, 2023, through both face-to-face and online meetings, with an

average interview duration of 30 minutes per session. The interview questions were designed by the authors, focusing on the Blockchain-related factors impacting consumers' intention to purchase food.

**Table 1. Characteristics of participants interviewed (n=18).**

Demographics Variables		Frequency	Percent (%)
Age	Old (51 and older)	5	27,8
	Middle-aged (36 - 50)	1	5,6
	Young (18 - 35)	12	66,7
Gender	Male	8	44,4
	Female	10	55,6
Career Fields	Education	4	27,9
	Technology	1	5,6
	Farmer	1	5,6
	Finance and Accounting	2	5,6
	Student	10	55,3
Monthly income (million VND)	<5	11	61,1
	5 - 10	2	11,1
	11 - 15	2	11,1
	16 - 20	1	5,6
	21 - 30	0	0
	>30	2	11,1

## 4. RESULTS AND DISCUSSION

### 4.1. Results

In our research, the authors did qualitative research as well as collecting information from eighteen consumers in Hanoi through an in-depth interview. When asked about Blockchain features, most participants believe that these features have a positive influence on their purchasing intention. The surveyees who joined in the in-depth interviews indicated that there are several factors of Blockchain affecting their purchasing decisions.

#### *Blockchain features in buying process*

The interview results illustrated that Blockchain's traceability exerted a positive influence on food quality, supply chain transparency, safety, and anti-counterfeiting. In other words, all respondents agreed that Blockchain's features play a vital role in the supply chain and indirectly affect the purchase intentions of consumers. Some of the responses collected are as follows:

- *I am strongly of the opinion that traceability requires production units to pay more attention to improving food quality. (Female, 46 years old)*

- *I will feel more secure when using products with clear origins than those with unknown origins. Moreover, Blockchain's traceability helps me to identify fake goods and differentiate them from authentic ones. (Male, 54 years old)*

- *If there is a large volume of information about product quality, and transparent origin, it will be easy for both consumers and manufacturers to monitor processes and discover mistakes. (Female, 20 years old)*

- *Information about the origin, ingredients, and production process of food is stored on a distributed and secure network owing to the decentralized feature of blockchain. This helps mitigate fraud and fake information about products. (Male, 20 years old)*

In addition, regarding in-depth interview results, when asked about the influence of supply chain

transparency on product quality and anti-counterfeiting, sixteen out of seventeen participants believe that transparency is positively related to both factors. Some of the responses collected are as follows:

- *For me, supply chain transparency has a tremendous impact on food quality and anti-counterfeiting because every step of the process is controlled and monitored. (Male, 20 years old)*

- *I suppose that transparency allows all members in the supply chain to be clear about how the product was created in the previous stage, monitor and validate each other, thereby eliminating poor quality products. Therefore, safety and anti-counterfeiting will also be maintained. (Female, 21 years old)*

However, besides the aforementioned ideas, there is a person who has an opposite perspective. She (20 years old) posited that supply chain transparency does not necessarily affect product quality and anti-counterfeiting. She explained that when organizations are clear about the supply chain, they can expose manufacturing processes to competitors, making products easier to imitate, causing counterfeits and poor quality products.

### ***Influences of Blockchain features and Consumer Awareness***

Blockchain features which include product quality, supply chain transparency, food safety and anti-counterfeiting play a major role in building consumer's trust and perceived usefulness, mitigating perceived risk.

In terms of perceived usefulness, the in-depth interviews revealed that food safety and anti-counterfeiting have an impact on the perceived usefulness of consumers. The interviewees believed that unsafe and counterfeit foods could affect their health. Additionally, information about certified and tested foods would be helpful for them in the process of purchasing and using food. Some of the collected feedbacks are as follows:

- *In my opinion, food safety and anti-counterfeiting have a significant impact on my perceived usefulness and trust in food. I am aware that using safe products and genuine items is crucial for my own and my family's health. Genuine products have been tested for food hygiene, ensuring they do not harm consumers' health. (Male, 54 years old)*

- *There are times when I spend a lot of time choosing the right product at the supermarket, and only after using it do I know if my selection was correct. For example, whether the fruits have been genetically modified, or if the fish eyes are clear and not cloudy. Is the apple or banana ripe enough? Is the pomelo suitable for offering prayers? It would be fantastic if technology could help me address these concerns. (Female, 25 years old)*

- *I find that livestock raised with clean ingredients and special processes have a better taste than those sold in regular markets. Transparency would help me eliminate the idea of buying unsuitable products. (Male, 34 years old)*

The exclusion of risks had a significant impact on perceived risk of consumers. Respondents firmly believed that the implementation of the Blockchain had the potential to significantly mitigate and eliminate any potential risks associated with unsafe food. This was particularly noted by individuals with strict lifestyles such as exercise enthusiast:

- *For someone like me who exercises at the gym or for children, product information is extremely important. I often pay attention to the nutritional intake of family members. Any substance that I know can have a negative impact on the health of children cannot be included in our family meals. (Male, 35 years old)*

- *Unsafe and counterfeit food greatly affects health and can cause unwanted illnesses. Therefore, I am concerned about products with anti-counterfeit labels and recognized as safe food. (Female, 20 years old)*

Furthermore, according to in-depth interviews, raising awareness about risks also helped sensitive individuals, such as pregnant women and patients, to shop and consume with a peace of mind:

- *For pregnant women, eliminating factors that could potentially harm the fetus is emphasized. For*

*example, heavy metals in seafood, preservatives and flavor enhancers that have been proven to be harmful to pregnant women should be avoided. (Female, 34 years old)*

The aforementioned elements of Blockchain features contribute to the trust in a brand, manufacturer, or product that applies these technologies. This argument is demonstrated as followed:

- *I frequently purchase aromatic products like Za'atar and Rasel Hanout from overseas because they are often unique and more fragrant compared to domestic products. Utilizing reputable trading channels helps me acquire the desired goods. I aspire for these products not to be counterfeited by other manufacturers. If Blockchain is implemented, it could instill trust in the place where I make my purchases, eliminating the need for extensive sourcing efforts and saving me time. (Male, 34 years old)*

Additionally, during the in-depth interviews, two participants expressed that food sold in supermarkets has a more transparent supply chain, giving them peace of mind when using those products. Some collected responses are as follows:

- *In general, I tend to forget, but I do some research before making a choice (e.g., buying vegetables at WINMART because I know their cultivation process takes place at Ecogreen). (Female, 20 years old)*

- *I feel that purchasing food at a supermarket provides a clearer supply chain transparency compared to buying at a traditional market. Transparency gives me a sense of cleaner products, and I trust them more. I don't worry as much about food safety and the risk of cancer. (Female, 20 years old)*

#### ***Influences of Blockchain features and Consumer awareness on purchase Intention***

When it comes to consumer organisms and intention, most participants revealed that their food-purchasing intentions are influenced positively by perceived usefulness and trust, and negatively by perceived risk. Only one respondent was not sure whether her buying intention is influenced by perceived risk or not. Meanwhile, some interviewees believed that these factors also affect repurchase intention and loyalty towards food products. Some of the responses collected are as follows:

- *I often care about the values that a product will bring to me, so perceived usefulness has a big impact on my purchase intention. (Male, 21 years old)*

- *If a particular brand's rice has multiple certifications and is safe, and I have previously used it without experiencing any negative effects, then I will develop a habit of only buying that type of rice in the future. This creates a sense of trust for me and helps me decide to buy that brand of rice. (Female, 20 years old)*

- *When I buy products that are not fresh and from unreliable suppliers, I am worried about potential health risks to myself and my family. Therefore, I will not make the purchase. (Female, 53 years old)*

Moreover, regarding in-depth interview results, when asked about the influence of perceived risk on the intention of buying food, the interviewees all shared the same opinion that perceived risk has a negative impact on their trust in food. A response is collected as follows:

- *When I become aware of the risks, it makes me more anxious about the product, and will negatively affect my trust. (Female, 20 years old)*

However, besides the same idea as the above, there were some people who had different perspectives. They argued that if the risk of food is under control, they will still believe in that product as the trivial food insecurity would not have a clear impact on their trust on that food.

The respondents also agreed that they will have intentions to purchase food if Blockchain features including product quality, supply chain transparency, food safety and anti-counterfeiting are facilitated by Blockchain's traceability. Besides the particular food considered, some of interviewees intended to purchase other products from the same brand equipped with all these features. Some of the responses collected are as follows:

- *I always have a desire to buy products with good quality, understand the production process, origin, food safety, and avoid food fraud. (Female, 20 years old)*
- *Not only do I buy the food with all these features but I also pursue other products from the same brand. (Female, 46 years old)*

#### **4.2. Discussion**

After the qualitative research process, the research results showed that factors such as Blockchain's traceability, product quality, supply chain transparency, safety, anti-counterfeiting, trust, perceived usefulness, and perceived risk all affect directly and indirectly on consumer's purchasing intention. The authors believe that future researchers should apply the official research model and combine it with quantitative methods to accurately determine the degree of impact of each factor on purchasing intention of consumers in Vietnam, thereby proposing appropriate solutions for decision-makers to promote purchasing decisions and behaviors in Vietnam.

#### **5. CONCLUSION**

The main contribution of this research is to synthesize the factors that both directly and indirectly affect consumer intention to purchase food. This study provides several benefits from Blockchain that should be considered for the development of the food market. Not only are sufficient and reliable Blockchain features significant to the creation of consumer trust and perceived usefulness towards food but they also mitigate and eliminate the potential of risk that poses a threat to consumers' health. Given that food-related issues such as unsafe, low-quality food, food fraud is so popular in Vietnam, providing credible Blockchain features by displaying how products are grown, processed, and handled, and the percentage of fresh or safe ingredients in a product is crucial to stimulate consumer experience to make informed buying intentions. Therefore, the government agencies not only need to take the responsibility to set regulations for agricultural products, but also need to encourage companies in this field to apply Blockchain to their supply chain and use Blockchain labels as a guarantee of safety and quality to boost their consumer purchase intention. Finally, this study was conducted in Hanoi, Vietnam with the aim to shed light on the consumer's perception of Blockchain and its benefits in food in particular as well as agriculture in general.

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## FACTORS INFLUENCING GREEN CONSUMPTION BEHAVIOR: IN THE CASE OF TOURISM IN VIET NAM

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**ABSTRACT:** *The aim of the study is to investigate the determinants of the sustainable consumption behaviors of Viet Nam tourists and their precise impacts on the behaviors by intergrading the Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), and Value-Belief-Norm Theory. The data was collected with a total of 201 valid answers from tourists visiting famous destinations within Ha Noi city and imported to SPSS 26.0 for further statistical analysis. Results show that all the hypothesis determinants have impacts on the green consumption behavior of tourists coming to Viet Nam, including Environmental Factors, Availability, Price, Mass Media, Subjective Norms, Social Influence, and Green Beliefs. The first empirical study broadly provides a theoretical framework for the green purchase behavior of tourists within Vietnam's territory. The theoretical and practical contributions to tourists' purchasing green products are discussed.*

**Keyword:** *Green Consumer Behavior, Tourist, Sustainable Development*

### 1. INTRODUCTION

Tourism has undoubtedly become a large and diffuse global industry (Ralf Buckley). On the one hand, moderate and well-distributed tourism plays an important role in the upkeep of the attractions and preserving the environment (Erik Cohen). Furthermore, tourism is also one of the major sources of income for some countries including Viet Nam. Tourism is considered a spearheading industry in Viet Nam with an AAGR of 22.7%, contributing up to 8.5% of Viet Nam GDP in 2018 (Tran Doan Cuong). However, it can also pose environmental threats as a mass industry (Erik Cohen). According to a report conducted by the Institute of Tourism Development (ITDR), a tourist discharges, on average per day, 5-10 plastic bags and 2-4 plastic cans and cartoons excluding one-time used personal items. In the same report, Viet Nam has been stated to welcome about 103 million both domestic and international visitors with, respectively, 3.04 and 7.08 days of staying on average. Based on the previous information, an estimation of 230.110 tons of plastic waste was ejected by the activities of tourism. The impact of tourism in Viet Nam has become huge enough to gain attention from the authorities in the past decade. Several circulars related to protecting the environment were passed by Viet Nam government. Yet, the root of the problem seems to be ignored. Firms have realized that focusing on “sustainability” as a business goal can thoroughly increase the firm’s competitiveness in the market and have been using Green Marketing Strategies to promote green purchases (Raska and Shaw). Abundant of studies have been carried out to examine green consumption behavior from distinctive perspectives in several regions. Chetali investigated different factors such as behavioral flexibility, peer group influence, and price, which determine green consumption behavior in India in the context of two product categories. Yasmin proposed a theoretical framework for the relations between value and identity, using intrinsic and extrinsic motivation as a mediator, to understand sustainable consumer behavior. Jieong Chen et al. have inspected the relationship between the rural tourism experience and post-experience green consumption intention of Chinese People. Closer to home, Hoai et al. examined the factors that influence the green consumption behavior of Gen Z in Viet Nam, including environmental awareness,

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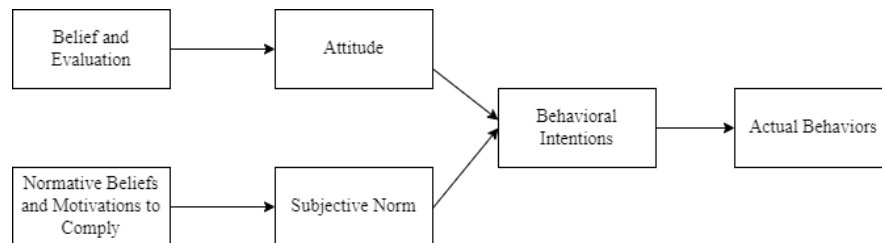
properties, price, and availability of green products. Nevertheless, consumer behavior is continuously evolving, demanding further investigations to understand the consumption pattern. Especially when there is insufficient study of Viet Nam tourists' green consumption behavior in Viet Nam, the need to develop a better understanding of tourists' green purchase behavior in Viet Nam has become more and more urgent. Thus, this paper aims to identify the determinants of the behavior, as well as suggest a framework of Green Consumption Behavior of Viet Nam tourists.

**2. LITERATURE REVIEW**

**2.1. Theoretical Orientation**

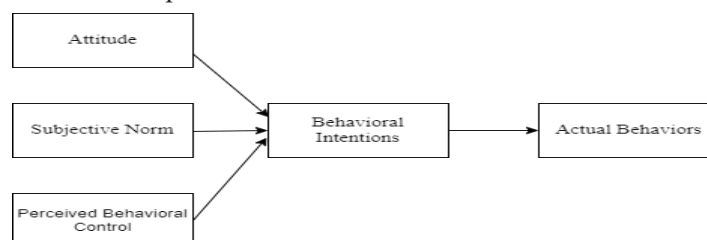
*\* Theory of Reasoned Action (TRA); Theory of Planned Behavior (TPB)*

TRA was first introduced in 1967 by Fishbein and being developed further in decades later by Ajzen and Fishbein. The TRA model has been used widely to explain the mechanism of human behavior in the decision-making process in a certain direction. The model suggests that the actual behavior of an individual is determined by the behavioral intentions, which is a function of two main factors, accordingly, personal attitude and subjective Norms. Attitude, according to psychology, is a set of feelings, beliefs and behavior toward a specific individual (or individuals), object or event. The attitude is usually the result of the experience or nurturing process and can strongly affect behavior. Although the attitude often lasts long, they can still be changed. Attitude toward behavior can be understood as how an individual feels about the consequences of the behavior. It can be either positive or negative depending on one's beliefs about the consequences. Normative Norms are an individual's perceptions of social pressure, or one's belief about what others think he/ she should or should not perform that act. Subjective norms refer to a smaller and more specific pressure from a group of important people to an individual such as friends or family. Subjective norms are a function of a person's normative beliefs about what important others think they should (or shouldn't do) and their motivation to do so (Ajzen and Fishbein, 1980).



**Figure 1. Model of The Theory of Reasoned Action**

Later, TPB – a more detailed version of TRA was developed by Ajzen in 1985 from the foundation of TRA. While TRA might prove to be effective when applied to voluntary control of an individual, TRA is vulnerable to intervening environmental conditions, in other words, TRA becomes less effective when the behaviors are not fully under voluntary control. TPB was able to overcome the weakness of TRA since the external environmental factors were considered. More precisely, the TPB model suggests that the actual behaviors are also determined by the behavioral intentions, and aside from the two determinants mentioned in TRA model, TPB model referred to perceived behavioral control as a factor controlling the intentions.



*Figure 2. Model of The Theory of Planned Behavior*

Perceived Behavioral Control can be seen as an individual's perception of the difficulty of performing a particular behavior whether it is easy or difficult. This depends on the availability of resources and opportunities to perform the behavior. Ajzen proposed that the perceived behavioral control factor directly affects the propensity to perform the behavior, and that if the individual correctly perceives his or her degree of control, then behavioral control also predicts the behavior. The concept of perceived behavioral control is conceptually related to self-control.

**\* Value-Belief-Norm Theory (VBN)**

Currently, consumers are increasingly interested in smart and sustainable consumption, as well as environmentally friendly products and services right from production to consumption and use of products. Today's consumption requires not only intelligence about product quality, but also a deep understanding of the sociability and humanity of each product. Previous studies have relied heavily on Ajzen's (1991) theory of planned behavior (TPB) to explain issues related to sustainable development. However, Slevitch et al. (2013) propose that consumer green behaviors are particularly associated with self-actualization, ranking highest in Maslow's hierarchy of needs (1970). According to these authors, self-realization can be achieved by doing something that benefits society, thereby meeting the internal development needs of a person. Therefore, when many people realize that their purchasing decisions directly affect the environment, it is essential in any investigation to consider green consumer behavior that is specifically related to personal factors, such as values, beliefs, and norms. One theory that has succeeded in solving this problem is the VBN theory originally developed by Stern (2000). The advantage of VBN theory is that it examines green behavior by considering some of the factors necessary for environmentalism, such as ecological values and worldviews (Stern, 2000). So, VBN theory has succeeded in addressing the pro-social motivations of individuals by considering rational selection models including self-interest motives related to green behavioral intentions in different contexts (De Groot and Steg, 2009, De Groot and Steg, 2010, Kim and Han, 2010, Han, 2015).

Although VBN theory (Stern, 2000) was developed to predict more practically important environmental behaviors than intentions of behaviors, recently, a growing research group has also used VBN theory to explore "behavioral intent," with the assumption that intention is considered the primary determinant of actual behavior (Hansla et al. the, 2008). For example, using VBN theory, Han (2015) investigated tourists' pro-environmental behavior in the context of green accommodation, while using behavioral intent as an outcome variable. Therefore, this study contributes to the literature by proposing and testing VBN theory as a framework for comprehensively understanding consumer decision-making processes in green consumer intent.

This study also attempts to expand VBN theory by combining two important structures: subjective norms and green beliefs. Although personal norms have been extensively dealt with in previous studies, not much has been tested in conjunction with subjective norms. However, Fishbein's earlier statement (1967) proposed that consideration of both personal norms and subjective norms would increase the understanding of behavioral intent for green behavior. In addition, according to Ajzen (1991), individuals' intention to behave in a certain way becomes even stronger when they believe that their family, relatives, friends, and other colleagues will value a particular behavior. There is growing evidence for the existence of a strong social consciousness that directly influences consumer purchase intent and post-purchase behavior (Domina and Koch, 2002, Ogle et al., 2004, Ibtissem, 2010).

## **2.2. Hypothesis and research model**

### **2.2.1. Environmental Factors**

Behavior-oriented personal attitudes are defined as positive feelings or negativity of an individual when committing such behavior (Schiffman and Kanuk, 1987). Attitude will decide one's buying preferences, and that's one of the important predictors most important behavioral intent. Other research also suggests that attitude is one of the important factors influencing behavioral intentions and is the best indicator for predicting behavior (Rana & Paul, 2017). Attitudes toward the environment are recognized as determinants of behavioral intent (Chan & Lau, 2001; Wesley et al., 2012; Law et al., 2017). This study aims to explore the influence of people's environmental consumption attitudes on intentions to buy green goods. According to D'Souza et al. (2007), environmental knowledge can be defined as the consumer's knowledge of the impact of using a particular product on environment. Environmental knowledge is an understanding of whether the product itself has produced in an environmentally friendly way or not (Polonsky, 2011; Lim and Associates, 2014). Many studies suggest that environmental knowledge is an impact factor to consumer behavior in all stages of the buying decision-making process environmentally friendly products. Also, according to Banytne et al. (2010), consumers the more they know about environmentally friendly products, the more motivated they will be product purchasing force. Knowledge of the environment is often cited as the main motivator of action. green microconsumer (Peattie, 2010; Zhao et al., 2014, Laroche et al., 1996, Noor et al. 2012). Based on the above studies, the author noticed a relationship between ants' Actual environmental practices and behaviors persist and are fact-tested in some studies rescue. For further verification, this view will be tested in the hypothesis section below:

**H1:** *Environmental factors positively affect product consumption behavior green.*

### **2.2.2. Subjective norms and the influence on green consumption behavior of visitors to Vietnam**

Subjective norms can be understood as the perception of social pressure to implement a specific behavior (Ajzen, 1991). The subjective norm shows the extent to which an individual feels be morally responsible to others by purchasing green products and creating should have a positive social image (Barber et al., 2014). Large number of studies have claims that social pressure encourages consumers to buy green products and is a among the dominant factors affecting sustainable consumption (Biswas and Roy, 2015; Zhao et al., 2014; Lorek and Fuchs, 2013; Wang et al., 2014; Ritter et al., 2015). Wansink et al. (2017) notes that attitudes, subjective norms, and behavioral control of the individual significantly influencing the intention of purchasing environmentally friendly products of an individual..., therefore, the author proposes the hypothesis that:

**H2:** *Subjective norms positively affect product intent green.*

### **2.2.3. Price and its impact on green consumer behavior of visitors to Vietnam**

Price, according to the Cambridge dictionary, is defined as the amount of money exchanged/purchased for a product or service. In economics, price is considered the main factor directly influencing the demand for a product or service. Specifically, the book "Microeconomics" (Roger A. Arnold, Daniel R Arnold, David H Arnold, 2022) referred to "The Law of Demand", which states that if the price of goods and services decreases, the demand for those goods and services will increase, and vice versa. Meanwhile, the amount of demand for goods and services or the decision to buy Consumer goods and services are thoroughly studied in behavioral theory consumers in which price is considered one of the external stimuli belonging to Marketing that influences the decision to purchase goods or services of the consumer (Susan L.Henry, 1991). Both aspects suggest that the price plays an important role in predicting behaviors. So, the hypothesis that is proposed is:



**H3:** *Prices have a negative effect on the green consumer behavior of visitors to Vietnam.*

#### **2.2.4. The availability and its impact on green consumer behavior of visitors to Vietnam**

The availability of green products is defined as the popularity or ease of the search for green products in the market. Sujay R. Nair and Hari Krishna Mahram argued that the difficulty of finding green products is a factor hindering green consumer behavior. Carmen Tanner and her colleagues found that Swedish consumers dislike spending time looking for green products on the market. Walia and her colleagues have also studied this issue and found that the availability of green products has a significant impact on consumer purchase intent, but the scope of the study is limited to fast-moving consumer goods. So, the proposed research hypothesis is:

**H4:** *Availability has a positive influence on the green consumer behavior of visitors to Vietnam.*

#### **2.2.5. Mass media and the influence on green consumption behavior of visitors to Vietnam**

Mass communication is understood as an opportunity for readers, viewers, and listeners to see a media message in the media (Schultz and Lauterbourl, 1993). So, is there a relationship between mass media that impacts green consumer behavior? The team hypothesized that:

**H5:** *Mass media positively influences green consumer behavior.*

#### **2.2.6. Green beliefs and influence on green consumption behavior of visitors to Vietnam**

Green beliefs are the willingness to depend on partners they trust (Moorman, Deshpande, and Zaltman, 1993). In other words, trust in honesty, the responsibility of the manufacturer, the information on the packaging, the trademark, and the quality assurance of TPAT products (Janssen and Hamm, 2011). Therefore, the team hypothesized that:

**H6:** *Green belief positively influences green consumer behavior.*

#### **2.2.7. Social influence and its impact on green consumption behavior of visitors to Vietnam**

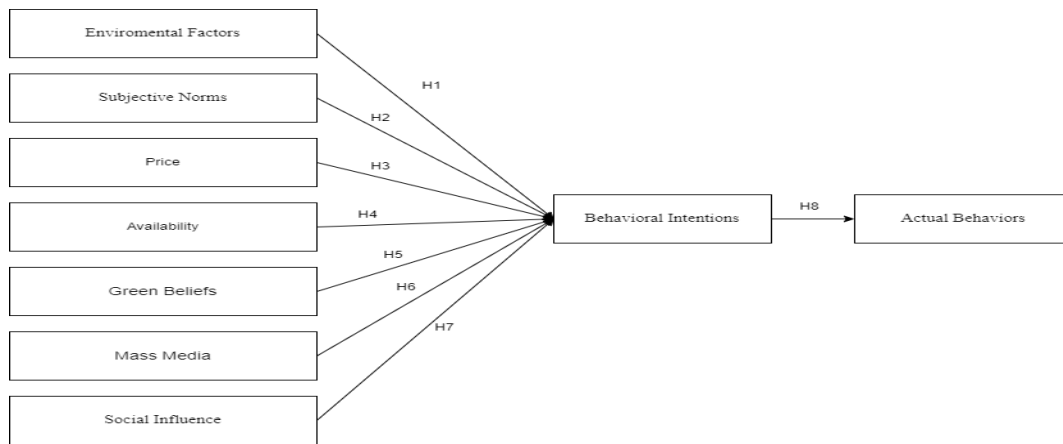
Consumers living in society will be greatly influenced by society, especially for goods such as green products – due to the low awareness and income of people in Vietnam – the influence of society plays a very important role in promoting changes in people's perception of green consumption, thereby influencing consumers' green consumption intentions. Snapping and Rahman (2011), and Hisami and Yousef (2013) also found a positive relationship between social influence on green consumer intentions and behavior.

**H7:** *Social influences have a positive impact on green consumption intentions.*

#### **2.2.8. Behavioral intentions and influences on green consumption behavior of visitors to Vietnam**

Purchase intentions refers to a product category's priority to consumers when they are at the purchase evaluation stage, as those priorities indicate a consumer's intent to purchase a particular product. Buying intent is a step in the buying decision process, which is the course of action that transitions from buying intent to actual buying behavior. Purchase intent is defined as a person's tendency to act on the choice of goods (Bagozzi & Burnkrant, 1979). Behavioral intentions are the most important factor for predicting consumer behavior Ajzen (1985), Venkatesh et al. (2003); some studies indicate that behavior can be determined from intention with considerable accuracy (Ajzen 1991). In many studies, intention is thought to be a strong predictor of behavior, so the author proposes a hypothesis:

**H8:** *Behavioral intent has a positive relationship with green product consumer behavior.*



**Figure 3. Proposed conceptual model of the green consumption behavior of Viet Nam tourists.**

**3. METHODS**

**3.1. Instrumentation**

The convenient sampling method was carried out to save traveling costs and reach more tourists. Since the surveyed subjects are very diverse and distributed over a large area, a convenient sample selection method is suitable for the research process. The survey was conducted by distributing questionnaires when surveying directly at tourist destinations in Hanoi and sending surveys online via social networks. To obtain the most suitable answer from tourists based on their actual observed behaviors, it took more time for the team to simultaneously conduct the survey and observe to check whether the answer is valid or not. Therefore, only a limited amount of 30 valid direct answers was added to the sample along with the results from the online surveys shared in tourists’ social media groups.

The final sample collected 201 valid answers from visitors. The data consists of 141 female (70.1%), 58 male (28.9%) and 2 individuals of other genders (1%). The age group accounting for the highest proportion in 201 samples is from 15 to 20 years old, there are 140 visitors (69.5%), from 21 to 30 years old there are 54 visitors (27%), from 31 to 40 years old there are 6 visitors (3%), from 41 to 50 years old there is 1 tourist (0.5%).

**Table 1: Sample**

	Sample	Frequency	Percent	Valid Percent	Cumulative Percent
Gender	Female	141	70.1	70.1	70.1
	Male	58	28.9	28.9	99
	Other Genders	2	1	1	100
Age	15 - 20	140	69.7	69.7	69.7
	21 - 30	54	26.9	26.9	96.5
	31 - 40	6	3	3	99.5
	5	1	0.5	0.5	100
	Total	201	100	100	

**3.2. Measurement Instrument**

The questionnaire was designed using a five-point Likert scale 1- strongly disagree and 5 - strongly agree. The questionnaire had 2 main parts namely: (1) socio-demographic characteristics of tourists (Age and gender) and (2) factors influencing tourists’ sustainable consumption behaviour during travelling. We have included demographic variables as control variables to reduce the possibility of baseless relationships

based on such personal characteristics. Except for Environmental Factors, which has 6 measurements, the rest of the variables (Subjective Norms, Price, Availability, Green Belief, Mass Media. Social Influence, Intentions and Behaviors) use only 3 measurements, which was all adapted from previous research in the field.

### 3.3. Research models

Answers was imported to SPSS 26.0 and descriptive statistical analysis and other analysis including Cronbach's Alpha Reliability and correlation were carried out; results on the reliability of the scales through Cronbach's Alpha reliability assessment, correlation analysis and the suitability of the research model to the hypotheses and come up with the model and the adjustment hypothesis.

## 4. RESULT

### 4.1. Cronbach's Alpha Reliability Assessment

The result of the scale reliability analysis by Cronbach's Alpha coefficients is quite high, indicating that the reliability of the questionnaire is good.

**Table 3. The result of the reliability test of the scale**

Factor	Cronbach's Alpha
<b>Environmental Factor, Cronbach's alpha = 0,830</b>	
I like the idea of green consumption (EF1)	0,786
Green consumption is a good idea (EF2)	0,785
I have a supportive attitude towards green consumption (EF3)	0,788
The government now encourages consumers to buy green products (SN2)	0,831
Most people around me use green products (SN3)	
<b>Price, Cronbach's alpha = 0,690</b>	
I noticed that the price of green products is clearly listed (p1)	
I noticed that the price of green products is high because of the high cost of production and business (P2)	
I find the price of green products in line with the quality (P3)	
<b>Availability, Cronbach's alpha = 0,745</b>	
I find it inconvenient to find green products as an alternative to regular products (A1)	
Green products are often not available in the regular stores I shop for (A2)	
I really don't know where green products are sold (A3)	
Mass Media, Cronbach's alpha = 0,785	
I see green consumption promotion media information on ads, television, internet, TV game shows... (M1)	
Modern developments are destroying the environment (EF4)	
Environmental pollution can only be improved when we act together (EF5)	0,793
Balancing the natural environment is complex and easy to lose (EF6)	0,827
I see many promotions and incentives when participating in consuming green products (M2)	0,715
I see information about eco-friendly products on travel guides or other travel guides (M3)	0,724
<b>Green Beliefs, Cronbach's alpha = 0,861</b>	
I believe in the honesty of the producer (GB1)	0,742
I believe in the responsibility of the producer (GB2)	0,753

I believe in safety endorsements, green product certification marks (GB3)	0,900
<b>Social Influence, Cronbach's alpha = 0,807</b>	
I want to buy green products to reduce environmental pollution (SI1)	0,717
I regularly introduce friends and relatives to the positive effects of green products (SI2)	0,823
I am willing to buy green products for individuals, families (SI3)	0,672
<b>Behavioral Intentions, Cronbach's alpha = 0,838</b>	
I/my family will buy green products because they cause less environmental pollution (I1)	0,751
<b>Subjective Norms, Cronbach's alpha = 0.670</b>	
My shopping decisions are influenced by my family members (SN1)	0,706
I plan to purchase green products for individuals/families (I2)	0,771
I would consider switching from an existing brand to an eco-brand (I3)	0,802
<b>Actual Behaviors, Cronbach's alpha = 0,867</b>	
I/my family often buy environmentally friendly products/services (B1)	0,878
When I/my family have a choice between 2 products, we usually buy products that are less harmful to others and the environment (B2)	0,820
I/my family buy green products on a regular basis (B3)	0,718

Cronbach (1951) gives a confidence factor for the scale. If a measurement variable has a Corrected Item – Total Correlation  $\geq 0.3$ , the variable is satisfactory (Nunnally, J. (1978), Psychometric Theory, New York, McGraw-Hill). Cronbach's Alpha coefficient value (Hoang Trong, Chu Nguyen Mong Ngoc (2008), Research data analysis with SPSS Volume 2, Hong Duc Publishing House, Page 24):

From 0.8 to close to 1: very good scale.

From 0.7 to close to 0.8: the scale measures good use.

From 0.6 or higher: qualifying scale.

Cronbach's alpha test results have 4 variables excluded from the model including: SN2, SN3, P1 and P3.

#### 4.2. Correlation Analysis

Building a correlation coefficient matrix helps to consider the linear correlation between variables in the model. Specifically, the team can look at the correlation between variables that are independent and the intermediate variable and the intermediate variable with the dependent variable, even between variables that are independent of each other. If the independent variables are closely correlated, we must pay attention to the phenomenon of linear multi-addictiveness. In addition, we can remove any independent variable if it is not correlated with the intention's variable. Pearson correlation coefficient will be used to quantify how close the linear relationship between quantitative variables is. If there is a close relationship between two variables, the problem of linear multiplication must be considered when analyzing regression (when the Pearson correlation coefficient  $> 0.3$ )

$$I = \beta_1 EF + \beta_2 M + \beta_3 P + \beta_4 SI + \beta_5 SN + \beta_6 GB + \beta_7 A + \alpha$$

Andy Field (2009) suggested that although it is possible to evaluate the linear relationship between two variables through the Pearson correlation coefficient, the test result if the test sig  $< 0.05$ , the variable pair is not linearly correlated (assuming a significance level of  $5\% = 0.05$ ). From the results of the above Person correlation analysis, the sig of pairs of independent variables with the intent variable is  $< 0.05$ , showing that the independent variables here are linearly correlated with the intentions variable. The sig coefficients of pairs of variables independent of each other are all  $< 0.05$ , these pairs of variables are linearly

correlated with each other except for 2 pairs of SN – A and SI – A with sig coefficients of 0.087 and 0.114 respectively, these two pairs are not linearly correlated with each other.

The results have shown that environmental factors, mass media, price awareness, subjective norms and green beliefs have correlation coefficients Pearson ranging from 0.3 to 0.5 indicating the correlation of these independent variables with the intermediate variable is a medium-strength. The social influence variable with a Pearson correlation coefficient of  $0.724 > 0.5$  demonstrates the correlation between social influence and intention is strong. As for these variables, the phenomenon of linear multi-additiveness must be considered when analyzing. The availability variable with correlation coefficients of 0.149 greater than 0.1 but less than 0.3 shows that the relationship between availability and intention is weak.

From the results of the above Pearson correlation analysis, the sig coefficient of the intentions variable pairing with the behaviors variable is less than 0.05, showing that the intentions variable has a linear correlation with the behaviors variable. The Pearson correlation coefficient between the intent variable and the dependent variable of 0.211, in the range of 0.1 to 0.3, proves that the pair of behavioral intent variables – green consumer behavior variables are weakly correlated.

### **4.3. Model Fit Test**

#### **4.3.1. R-squared**

After correlation analysis, the team put 7 independent variables (EF to A), 1 intermediate variable I, and 1 dependent variable B into the regression model, then proceeded to test R-Squared. R-Squared shows how much the study hypothesis model fits into the data. The team proceeded to conduct Regression Analysis. There are 3 out of 5 independent variables have a positive impact (with a Beta factor of  $>0$ ) and 2 have a negative impact on the dependent variable. The low Standardized beta coefficients of variables indicated that the variable has weak affection on the model. This may be temporarily acceptable due to objective reasons of resources and bias in the team's analysis. The group tentatively concluded that there are 5 factors affecting the green consumption behavior of visitors to Vietnam, of which social influence and environmental factors have the greatest influence on the model.

#### **4.3.2. T-test**

From the Coefficients table, the sig value of the t-test is used to verify the significance of the regression coefficient. If the sig value of the regression coefficient of an independent variable is less than 0.05, we can conclude that the independent variable has an impact on the dependent variable. If the sig value of the independent variable is greater than 0.05, we conclude that the independent variable has no effect on the dependent variable, and there is no need to remove that variable to run the regression again the second time. On the basis of regression analysis, the sig coefficient of  $t < 0.05$  demonstrates that the model is statistically significant.

#### **4.3.3. VIF**

VIF (Variance Inflation Factor) is used to test the phenomenon of linear multi-additive. Typically, if the VIF of an independent variable is greater than 10, there is linear multi-additive phenomenon occurring with that independent variable. Then this variable will have no value to explain the variation of the dependent variable in the regression model. For research works using the Likert scale, the best VIF coefficient is  $<2$ , ensuring that no linear multi-additive phenomenon occurs. With the results of the analysis in the Coefficients table, the team found that the VIF values were all  $<2$  demonstrating variables without linear polyaddition and that the model was guaranteed statistical significance.

## 5. DISCUSSION

Stemming from the actual research results, the group made a number of proposals for tourism businesses or tourism-related businesses and tourists themselves in Hanoi city in making decisions to buy and consume green products during travel, thereby serving as a premise for improving accessibility to each visitor effectively for tourism businesses and related services.

**As for tourists**, “Environmental Factors” and “Social Influences” have a great influence on the consumption behavior of tourists, they are aware that green consumption should be done to protect the environment, limiting the use of many products that pollute the environment, but due to the short travel time, they often do not care or even have no time to think of green consumption when traveling, they only buy products they prefer at tourist destinations, so it is difficult to change their behavior but there is still a solution that can be solved, which is to change the behavior of selling products at tourist destinations. Local people, tour guides or sellers of products at tourist destinations should be equipped with the knowledge related to green consumption. Whenever there is visitors, event organizers, sellers, guides should regularly propagate about green consumption, protect the environment so that tourists can be aware of in the process of traveling and practice green consumption behavior when traveling in Vietnam.

**As for firms**, first, “Social Influences” and “Environmental Factors” are 2 determinants that have a great influence, promoting consumption intentions and leading to green consumption decisions of tourists in Hanoi city. These two factors include the desire to protect the environment, awareness of the benefits of green consumption, awareness that the environment is being undermined and the willingness of visitors to take action to fulfill that desire. Businesses can promote tourists’ consumption decisions by influencing their desires, increasing their desire to do good deeds for the environment or increasing propaganda about green products to protect the environment, tourism services that come with programs that benefit tourist destinations in particular and the living environment in general or increase awareness of the product/service. Specifically, enterprises can carry out activities to protect the ecological environment when tourists are traveling or at tourist destinations, organize regular environmental protection transmission activities to firmly reinforce tourists’ green consumption intentions, exhibiting green products with many good thoughts for the environment can increase the excitement and fun of green activities, from which visitors can easily consume green products/services with a comfortable mentality.

Secondly, “Green Beliefs” also has a great impact on the green consumption intentions of tourists when traveling in Hanoi city. Enterprises must always focus on the production process from input to output, from raw materials to finished products. Because, only when enterprises produce honestly and responsibly, tourists will have the confidence to consume green products with the meaning of environmental protection. In addition to the other two qualities, green product certification issued by the government is also a strength, a lever that turns tourists’ consumption intentions into green consumer behavior.

Thirdly, today’s society is increasingly developing, there are many social networking platforms that can directly reach tourists, but the mass media of green products/services is still very sparse and fragmentary, making visitors unable to access the deepest, the most complete of green products/services. According to the results of the survey and analysis team, the “Mass Media” is a significant determinant affecting the consumption intentions and consumer behavior of tourists in Hanoi city. Therefore, the group recommends that businesses focus strongly on developing and expanding communication on different platforms and methods to get closer to visitors and customers in general.

Finally, an indispensable factor that also contributes greatly to promoting intentions into green consumer behavior is “Availability”. This factor means presence, or availability around when customers

want to consume. According to the survey results, most visitors find it inconvenient to take time to learn green products to replace conventional products, realizing that not always green products are right next door, can be consumed anytime, anywhere like regular products. Therefore, businesses should focus on distributing products/services more widely and more commonly in many different tourist areas so that visitors can see green products / services anytime they need them instead of using conventional products.

## **6. CONCLUSION**

Research results show that 8 factors strongly influence the green consumption behavior of visitors to Hanoi. Among them, the strongest impact factor was “Behavioral Intentions”, with an average score of 3.986 and Cronbach’s Alpha of 0.838; these include the “Social Influence” factor with an average score of 3.87 and Cronbach’s Alpha of 0.807; followed by the “Green Beliefs” factor with an average score of 3.59 and Cronbach’s Alpha of 0.861, “Mass Media” with an average score of 3.56, and Cronbach’s Alpha of 0.785 1; “Environmental Factors” with a average score of 2.52 and Cronbach’s Alpha of 0.830; finally, “Availability” with an average score of 3.363 and Cronbach’s Alpha with a GPA of 0.745, “Price” with an average score of 3.78, and Cronbach’s Alpha of 0.69; finally, “Subjective Norms” with an average score of 3.326 and Cronbach’s Alpha of 0.676. The green consumption behavior of tourists is also heavily influenced by the factor “Intentions”. Behavioral intentions show a willingness of consumers to consume green products. It is considered the premise of the implementation of the act of consuming green products. This conclusion is also consistent with the opinion of the authors Dr. Pham Thi Huyen, Nguyen Thi Van Anh, Dao Ngoc Han, Tran Trung Kien and Do Tri Tu.

In the context of government agencies and businesses strongly launching incentive programs on green consumption today, it is not necessary for a person to have a pre-existing interest and awareness of environmental issues to know about green consumption and thereby generate green consumption behavior. The biggest impact affecting the green consumer behavior of visitors to Vietnam is the purchase intention with the choice of environmentally friendly or conventional goods.

Besides, if consumers live in a society, they will be greatly influenced by society, especially for goods such as green products. The characteristic of Vietnamese society in general is that people live in a community that is strongly influenced by relationships. If an individual lives in an environment where the surrounding relationships have green consumption intentions and behaviors, that individual will suffer many impacts that lead to green consumption behaviors.

However, we can’t deny the impact of “Green Beliefs”, “Mass Media” and “Environmental Factors” green consumer behavior. Despite of being influenced by society, the person has no faith in the use of green products or does not care about environmental issues or is not aware of the seriousness of environmental problems and the need for environmental protection, they are not likely to care about green consumption and will not intend to consume green products. Along with that, in order for green beliefs to spread to people faster and stronger, mass media also play an important role.

Along with these factors, “Availability”, “Price” and “Subjective Norms” also contribute to influencing the green consumption behavior of visitors to Vietnam. The difficulty of finding green products hinders visitors from consuming green products. Due to low awareness and incomes of Vietnam – the influence of prices plays a very important role in the consumption choices of Vietnamese tourists.

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## FACTORS INFLUENCING THE UNIVERSITY CHOICE DECISIONS OF HIGH SCHOOL STUDENTS.

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*Abstract: The objective of this research is to identify the impacts of influencing factors on the university choice decisions of high school students in Vietnam and propose recommendations for students, educational institutions, employers, and the government to optimize the university selection process. This study takes place in the current context following the COVID-19 pandemic and the recent wave of studying abroad nationwide. Survey data collected from 662 high school students and 538 university students, including 547 surveys from the Northern region, 439 surveys from the Southern region, and 214 surveys from the Central region, have been analyzed. The results from multiple regression analysis using SPSS software indicate that Student Characteristics, Significant persons, Fixed university characteristics, Social Media, and University Efforts to Communicate with students significantly impact University choice decisions.*

*Keywords: University choice decision, High school students, Covid-19.*

### 1. INTRODUCTION

After 1986, Vietnam witnessed the emergence of private universities alongside the existing public system. By 2022, 60 private universities operated nationwide, and 400 collaborative programs with foreign countries enrolled over 25,000 students (Ministry of Education and Training, 2022). This expansion led to increased competition among universities and a wave of studying abroad. However, the COVID-19 pandemic shifted the trend, favoring domestic higher education due to cost advantages and improved quality. This change offers multiple choices for high school graduates and opportunities for the development of universities in Vietnam.

Vietnamese higher education now benefits students, universities, employers, and the government. Students seek quality education and competitive advantages in the job market. Universities aim to attract capable students to enhance their reputation and attract more high-quality individuals. Employers hope for skilled labor to meet their requirements. The government benefits from a prosperous nation when these interests align. Students' university choices are central, influencing all stakeholders' interests. Making the right choice helps students achieve their goals, benefits employers, and drives universities to improve educational services in line with the labor market's needs.

To further explore the factors influencing the decision-making process of high school students in selecting universities and their impact, research was conducted, surveying over 1200 high school students and university students nationwide. The study aims to determine the influences of these factors on the university choices of high school students in Vietnam and propose recommendations for students, educational institutions, employers, and the government to optimize the university selection process for high school students in the country.

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## **2. THEORETICAL FRAMEWORK**

### **2.1. University choice decision**

High school students face uncertainties during the university selection process, particularly regarding their acceptance into a university (Randall G. Chapman, 1986). While students start with complete information about their preferred university, new information can influence their initial choice. Eventually, students make their selection, though some may defer enrollment due to financial or personal reasons. Economists approach the university choice as a human capital investment decision, assuming that the lifetime economic benefits will outweigh the educational costs (Becker, 1993; Ellwood & Kane, 2000; Paulsen, 2001). They believe individuals calculate the total benefits of attending a university and compare them with the expected costs. On the other hand, sociologists view the decision as an interaction between educational aspirations and difficulties. They emphasize the influence of cultural and social capital, like parental educational attainment and family income, on students' educational aspirations. This sociological approach mainly focuses on the early stages of the university choice process, explaining how an individual's social position shapes their educational aspirations and university choice (Bourdieu, 1986; Hearn, 1988; McDonough, 1997; Terenzini et al., 2001). It differs from the economic approach, which concentrates more on benefits-cost analysis at later stages of the university choice process. In conclusion, the university selection process for high school students involves uncertainties and is influenced by both economic and sociological factors, which shape their decision-making and aspirations.

### **2.2. Factors Influencing the university choice decision**

The research on university selection decisions among high school students in Vietnam has identified two main groups of factors that influence their choice: (1) internal factors, which include (i) significant persons and (ii) student characteristics; and (2) external factors, which consist of (i) fixed university characteristics and (ii) university efforts to communicate with students.

#### **2.2.1. Internal factors**

##### *2.2.1.1. Significant persons*

High school students experience pressure from their "reference group" and strive to meet their expectations. Family and friends play a significant role in influencing students' university selection decisions in two ways: (1) by shaping their perceptions of universities and (2) by directly providing advice on which universities to consider (D.W.Chapman, 1981). The influence of individuals around them positively affects students' university choices. Therefore, the hypothesis **H1: Significant persons have a positive effect on the student's choice of university.**

##### *2.2.1.2. Student characteristics*

Personal abilities and interests are crucial factors that impact students' decisions, including their university choices. Student ability and talent are considered major factors influencing the selection of colleges and universities (Manski, C. and Wise, D., 1983). Interests and career goals are also essential factors influencing student choices (Mehboob, Shah, and Bhutto, 2012). The awareness of the match between personal abilities and the university program's requirements significantly influences student decisions (Cabrera & Nasa, 2000). Personal characteristics have a positive impact on high school students' university selection decisions. Therefore, the hypothesis **H2: Student characteristics have a positive impact on the university selection decisions of high school students.**

### **2.2.2 External factors**

External factors that influence university selection decisions include fixed university characteristics, geographic location, costs, facilities, reputation, and the academic program.

#### *2.2.2.1 Fixed university characteristics*

University characteristics play a crucial role in the decision-making process of university selection (Pham Thi Ly et al., 2006). The geographic location of the university is also a significant consideration, impacting students' costs and convenience while studying. Additionally, the cost of studying, encompassing financial, time, and psychological factors, influences the choice of university. University facilities, both physical and non-physical assets, are also important factors affecting university selection (Ivy, 2008). The reputation of the university holds weight as it directly impacts employment opportunities after graduation. Furthermore, the academic program's quality is a key determinant of student satisfaction with their education and future career prospects (Yusof et al., 2008; Ivy, 2010; Sia, 2010). Overall, it can be concluded that external factors significantly influence high school students' decisions when selecting a university. Based on these factors, the author group proposes hypothesis **H3: Fixed university characteristics have a positive impact on high school students' university selection decisions.**

#### *2.2.2.2. University Effort to Communicate with students*

Universities' communication activities significantly influence students' decisions in choosing a school, encompassing advertising, enrollment events, and campus tours (Kee Ming, 2010). Among the various sources of information, the university's website and the "University Admissions Guide" hold the utmost importance and are extensively consulted by students when making their decisions (Nguyen Minh Ha et al., 2011). Information, admission policies, specific activities, and media also play a role in impacting students during the information-gathering stage (Litten, 1982). The effectiveness of communication and admission counseling has a considerable impact on students' university selection decisions. Based on these factors, the author group proposes hypothesis **H4: University efforts to communicate with students influence high school students' decisions in choosing a university.**

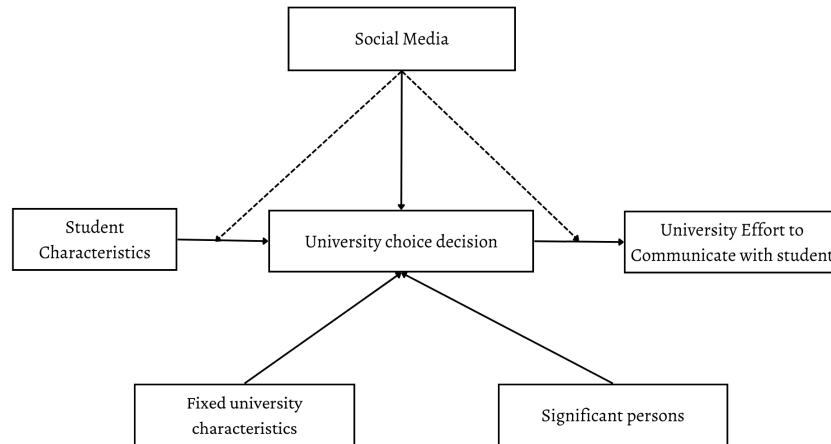
#### *2.2.2.3. Social media*

Social media is a participatory structure that allows individuals to collaborate and share information online. It includes platforms such as YouTube, LinkedIn, Facebook, and Twitter (O'Reilly, Cooke and Buckley, 2008). Social media provides information about different universities, evaluations from experts, and success stories of alumni. It allows users to interact and provide feedback, evaluations, and create differentiation of opinions about a university. Social media has a significant impact on human decisions and actions, particularly in relation to universities. "Media users actively choose specific content based on their needs, and if there is any impact, it is on their awareness or intention to act" (Matei, 2010). Among those surveyed, 68% had used social media to research universities and colleges. Additionally, about 70% of those surveyed believed that social media had a significant, but reasonable, impact on their decision to search for their college or university (The 2014 Social Media Report, Dalfonso, Pratt, and Rogers, 2014). It provides opportunities for universities to present necessary information and can positively influence the behavior, perception, and decision-making process of prospective students. Choudaha (2013) suggests that advertisements about campus life, which can be posted on YouTube and university websites, provide a virtual and effective communication platform for prospective students. With the increasing use of mobile devices, tablets, and the internet, this recruitment strategy has become more effective and important. Therefore, Nurlida (2009) accurately noted that "the satisfaction of prospective students with their choice of university depends on their satisfaction with information related to the university's attributes". Facebook is a good platform for universities to connect with prospective students, as university students often use

this social media platform. However, universities need to ensure that information is conveyed correctly and completely. Based on the factors mentioned above, the research team proposes hypothesis **H5: Social media has an impact on the decision of high school students in choosing universities.**

**2.3. Proposal research model**

The authors propose five factors that influence high school students’ university choices, based on a comprehensive review of previous studies and the current research situation. The research model includes two internal factors: Significant persons and Student Characteristics, and three external factors: fixed characteristics of the university, the university’s communication efforts with students, and social media platforms (Figure 2).



**Figure 2: Research Model**

*Source: Research result*

Specifically, the influence of internal factors is based on Jim Blythe’s reference group theory (2009) and consumer behavior theory by Comegys et al. (2006). The impact of student’s personal factors is based on the theory of planned behavior by Cooke and Sheeran (2004), in which the theory of reasoned action and theory of planned behavior are the basis for the impact of other factors on high school students’ university choices.

The research hypotheses proposed by the authors include:

- H1: Significant persons have a positive influence on their university choice.
- H2: Student characteristics have a positive influence on high school students’ university choices.
- H3: Fixed university characteristics have a positive influence on high school students’ university choices.
- H4: University effort to communicate with students has an influence on high school students’ university choices.
- H5: Social media has an influence on high school students’ university choices.
- H6: Social media has an impact on the relationship between personal factors and university choice.
- H7: Social media has an impact on the relationship between the university’s communication efforts and high school students’ university choices.

**3. RESEARCH METHODS**

**3.1. Research Methods**

The authors used two main research methods called desk research method and field research method:

- **Desk research method:** (i) researching from domestic and foreign research works to determine the theoretical framework, and research model; (ii) analyzing and discussing research findings and suggesting recommendations.

- **Field research method:** conducting in-depth interviews and survey questionnaires for two groups of subjects, students studying at high schools and students studying at universities. The content of the field research method will be described in detail in the context of data collection methods.

### 3.2. Data collection methods

The authors conducted a study in Vietnam to identify factors influencing students' university selection decisions. They used qualitative in-depth interviews and a quantitative questionnaire survey for primary data collection, along with various analytical methods like Cronbach's Alpha, EFA, CFA, and SEM. The authors also gathered secondary data through desk research, reviewing relevant literature and research studies on university selection and decision-making behavior from national and international sources using search engines like Google Scholar and Research Gate.

### 3.3. Sample size and study

After collecting the survey questionnaires, the author team obtained a total of 1263 votes through face-to-face and online surveys. They screened the questionnaires and selected 1200 formal observations for the quantitative study, excluding incomplete responses and those from uncooperative respondents who provided inconsistent answers to synonymous questions.

## 4. RESULTS AND DISCUSSION

### 4.1. Results

#### 4.1.1. Quantitative research findings

##### 4.1.1.1. Descriptive statistics

The study focused on Vietnamese students. 1200 valid questionnaires were collected and analyzed using SPSS 20.0. Demographic information, including gender, family income, geographical region, high school, field of study, and city, is presented in Table 1.

**Table 1. Descriptive statistics of the formal quantitative research sample.**

	Standard	Number of observations	Percent (%)
Total		1200	100
Sex	Female	730	60.8
	Male	470	39.2
Job	Pupil	662	55.2
	Student	538	44.8
High school currently / attended	Public schools	837	69.8
	International Affiliate School	203	16.9
	Private school	157	13.1
	Self-financed public school	2	0.2
The field you want to study	Economy	540	45
	Technique	330	27.5
	Pharmacy	123	10.25
	Language	101	8.42
	Art	50	4.17
	Other Sectors	56	11.6

Regions where you are studying and living	North	547	45.6
	Southern	439	36.6
	Central region	214	17.83
The city where you are studying and living	Hanoi	304	25.3
	Ho Chi Minh City	149	12.4
	Other Cities	747	62.25
Average monthly income of the family (VND)	From 20 million or more	287	23.92
	15 million - less than 20 million	193	16.08
	10 million - less than 15 million	214	17.83
	5 million - less than 10 million	171	14.25
	Under 5 million	185	15.42

Source: Survey result

#### 4.1.1.2. Reliability Test with Cronbach's Alpha

The scale will first be analyzed for Cronbach's Alpha reliability coefficient, variables with item-total correlation coefficient less than 0.3 will be eliminated and the scale will be accepted for analysis in the next steps. according to Cronbach's Alpha reliability of 0.6 or higher (Ha Nam Khanh Giao & Bui Nhat Vuong, 2019).

**Table 2. Results of Cronbach's alpha analysis and variable-total correlation**

The scale	Number of observed variables	Cronbach's alpha	Correlation coefficient of variable - minimum sum
Significant Persons	6	0.878	0.658
Student Characteristics	4	0.800	0.592
Fixed University Characteristics	8	0.913	0.684
University Efforts to Communicate with Students	5	0.838	0.601
Social Media	3	0.878	0.731
University Choice Decision	3	0.867	0.730

Source: Research result

Based on Table 2, the analysis results show that the value of Cronbach's Alpha fluctuates in the range from 0.8 to 0.913, and the minimum coefficient of correlation for each variable is greater than 0.3. Therefore, the scales have gained such confidence and will be used for exploratory factor analysis.

#### 4.1.1.3. Exploratory Factor Analysis (EFA) result

Factor analysis is conducted to examine the potential for reducing a large number of observed variables to a smaller set of variables. This enables the easy assessment of relationships between factors (representing variables if necessary).

**Table 3. Results of the Kaiser-Meyer-Olkin (KMO) test for the observed variables.**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.921
Bartlett's Test of Sphericity	Approx. Chi-Square	18.921.715
	df	435
	Sig.	0

Source: Research result



The initial exploratory factor analysis shows promising results. The KMO coefficient of 0.921 ( $> 0.5$ ) indicates strong correlation among observed variables in the population, making the EFA factor analysis appropriate. Using Eigenvalues greater than 1 and the principal components extraction method with varimax rotation, 6 factors were extracted from 29 observed variables, explaining 57.11% of their variation, meeting the necessary requirements. These 6 factors will be retained in the model.

4.1.1.4. *Confirmatory Factor Analysis*

The authors utilized Confirmatory Factor Analysis (CFA) to assess the model’s fit with the observed data. The CFA results show good alignment, with a significant Relative Chi-square value of 2.940 (below 3). Compatibility tests also yielded positive outcomes: CFI = 0.960, GFI = 0.942, TLI = 0.955, RMSEA = 0.040, and PClose = 1.00. Additionally, the Maximum Likelihood Estimates factor validation analysis confirms the model’s reliability, convergent validity, and discriminant validity. CR values range from 0.801 to 0.912 (all above 0.8), and AVE values range from 0.502 to 0.643 (all above 0.5). Moreover, all MSV values are lower than the corresponding AVE values.

4.1.1.5. *Structural Equation Modeling*

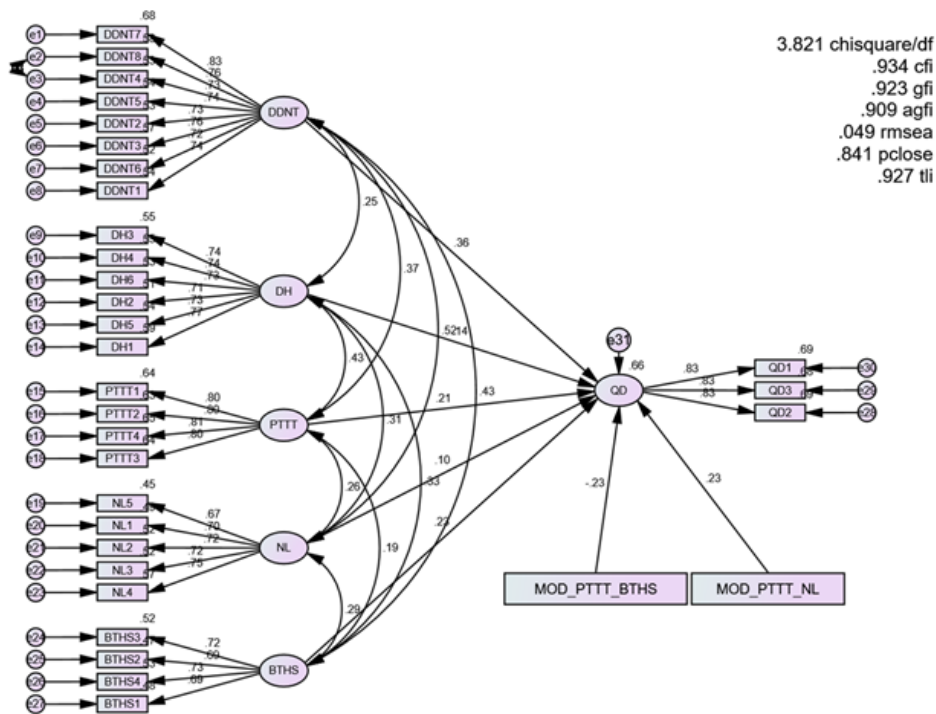


Figure 2. SEM result

Source: Quantitative research results

Table 3 depicts that the P-value of the impact of all indicators on QD is less than 0.5; therefore, the test accepts the hypotheses H1, H2, H3, H4, H5, H6, H7.

Table 3. The result of analyzing SEM

The relationship of indicators			Estimate	S.E.	C.R.	P	Estimate
QD	<---	BTHSA	0.255	0.033	7.818	0,000	0.229
QD	<---	NLA	0.14	0.04	3.46	0,000	0.101
QD	<---	PTTTA	0.216	0.029	7.563	0,000	0.211

QD	<---	DHA	0.168	0.033	5.027	0,000	0.141
QD	<---	DDNTA	0.359	0.032	11.238	0,000	0.362
QD	<---	MOD_PTTT_BTHS	-0.144	0.013	-10.942	0,000	-0.234
QD	<---	MOD_PTTT_NL	0.121	0.011	10.818	0,000	0.231

Source: Quantitative research results

Table 3 shows that DDNTA has the strongest impact on QD with a coefficient of 0.362. BTHSA and PTTTA also strongly influence QD. All positive factors (DDNTA, BTHSA, PTTTA, DHA, and NLA) have a positive influence on university choice. PTTTA moderates the relationship between BTHSA and QD negatively but positively with NLA and QD.

#### 4.1.1.6. One-Way ANOVA Test

**Results of the One-Way ANOVA analysis by region in Appendix 2,3 shows that:**

- DHA: The Northern and Central regions of Vietnam have similar scores, higher than the Southern region. Hence, the Southern region shows less dependence on this factor.
- BTHSA: The Central region has significantly lower scores compared to the Northern and Southern regions.
- DDNTA: The Northern and Southern regions have higher scores than the Central region, indicating more concern for this factor.
- NLA: The Northern region shows slightly higher scores than the Southern and Central regions.
- PTTTA: Interest in social media decreases from the Northern to Southern to Central regions.

**The hypothesis testing for comparing by type of educational institution in Appendix 4,5 indicates that:**

- DHA: Gap year students prioritize this factor more than students in other types of schools.
- BTHSA: Gap year students and students in public and private schools consider their own characteristics when choosing a school more than students in public and international schools.
- DDNTA: Most students and gap year students pay attention to school characteristics, but students from international schools show less interest.
- NLA: Gap year students have a higher average score in terms of the school’s communication effort, while international schools have a lower average score.
- PTTT: There is a slight difference in the average values, with international schools showing a slightly lower interest in social media compared to other groups.

#### 4.1.2. Qualitative research findings

##### 4.1.2.1. Criteria for selecting an ideal university

“ I think the reputation of the university greatly influences future employment opportunities, as businesses are very interested in candidates graduating from reputable institutions.”

*(12th-grade student, Foreign Language Specialized High School)*

“I prioritize the quality of the university’s lecturers. Lecturers need to have solid expertise to train students with good knowledge and skills, effectively serving the needs of businesses.”

*(12th-grade student, Thai Nguyen Specialized High School)*

**Source: In-depth interview results**

**4.1.2.2. The Influence of Significant persons on High School Students' University choice decision.**

“My personal preferences have a significant impact on my decision. I also think that my passion for the chosen field will greatly influence my attitude towards learning at the university. However, I will still balance it with other factors such as the future prospects of the field.”

*(10th-grade student, Tran Phu High School, Hoan Kiem District, Hanoi)*

“Among the factors related to myself, my talent is what I care about the most. I will choose a field that matches my talents.”

*(2nd-year student, British University Vietnam, Hanoi)*

**Source: In-depth interview results.**

The above opinions serve as typical examples supporting the assertion that “the decision-making process of high school students in choosing a university is influenced by personal factors such as academic performance, interests, and career goals” and “interests also play a significant role in university selection,” as discussed by the authors.

**4.1.2.3. The Influence of Fixed university characteristics on High School Students' University choice decision.**

“In my opinion, the reputation of a university and job opportunities are the top important factors when considering what a university has to offer.”

*(10th-grade student, Thai Nguyen Specialized High School)*

“Due to limited financial conditions in my family, the tuition fees of a university are a crucial consideration for me. I have found a university that provides quality education at an affordable and stable tuition fee. The low tuition fee has helped reduce the financial pressure while studying at the university.”

*(2nd-year student, Journalism and Communication Academy, Hanoi)*

**Source: In-depth interview results**

These responses are similar to the following observations: “The reputation of a university is also considered a significant factor as it impacts post-graduation job opportunities,” “Tuition fees are one of the meticulously considered factors, and students need to consider their family’s financial situation,” and “Students often seek universities located in major cities with specialized and career-aligned programs.”

**4.1.2.4. The Influence of University Efforts to Communicate with Students on High School Students' University choice decision.**

Summarizing Opinions on the Influence of University Efforts to Communicate with students:

“I believe that the university’s website is something that universities should invest in heavily. Websites that provide comprehensive information are extremely helpful for us during the research process and making decisions.”

*(3rd-year student, Ho Chi Minh City University of Economics)*

“I have attended some admission counseling events, and I found that these events introduced me to more universities.”

*(12th-grade student, Thai Nguyen Specialized High School, Thai Nguyen)*

Comparing with the factors mentioned in Chapter 2, the authors have identified the following similar factors: University website, Admission counseling activities, Campus tours of universities, and Career guidance activities in high schools. However, the importance attributed to these factors varies among individuals.

**4.1.2.5. The Influence of Significant Persons on High School Students' University choice decision**

Summarizing Opinions on the Influence of Significant Persons with Impact:

“My decision relies heavily on my parents. Since my parents are the ones who pay for my education, I have to follow their decisions.”

*(12th-grade student, Foreign Language Specialized High School, Hanoi)*

“I trust the most in the information provided by previous students because they are the ones who have directly experienced university education.”

*(3rd-year student, National Economics University, Hanoi)*

**Source: In-depth interview results.**

It can be observed that parents have a significant influence on the interviewees.

#### 4.1.2.6. *The Influence of Social Media on High School Students' University choice decision.*

Summarizing Opinions on the Influence of Social Media:

“I frequently use social media to search for information. I believe that social media provides me with diverse information about universities, and I think that information has a significant impact on students. “

*(12th-grade student, Specialized High School, Thai Nguyen Province)*

As discussed, the interviewees affirm that social media has a significant influence on their university choice decision.

## 4.2. Discussion

After conducting quantitative and qualitative research, the influential factors were determined to be Fixed University Characteristics (DDNTA), Student Characteristics (BTHSA), Social Media (PTTTA), Significant Persons (DHA), and University Effort to Communicate with Student (NLA). The study accepted seven hypotheses (H1, H2, H3, H4, H5, H6, H7).

Among these factors, DDNTA had the strongest impact on the university choice decision. BTHSA and PTTTA also significantly influenced the decision. The order of influence was as follows: (1) DDNTA, (2) BTHSA, (3) PTTTA, (4) DHA, (5) NLA.

Furthermore, the research revealed relationships between the factors. The moderating variable, PTTTA, influenced the relationship between BTHSA and QDA, as well as the relationship between NLA and QDA. Additionally, PTTTA had a negative impact on the relationship between BTHSA and QDA, while positively influencing the relationship between NLA and QDA.

## 5. CONCLUSION AND RECOMMENDATION

This research study explores and examines the factors influencing Vietnamese high school students' university choice decisions and provides recommendations for relevant stakeholders. The study employs a mixed-methods approach, combining qualitative and quantitative research, and yields the following results: (1) The relationship between factors influencing university choice decisions, (2) the “Fixed University characteristics” factor has the greatest influence on students' university choice decisions, (3) “Student Characteristics” factor is the second most influential factor, and (4) Social media also significantly influences high school students' university choice decisions.

Based on these findings, the authors offer recommendations to the government and universities, including measures to regulate asymmetrical information, enhance university infrastructure, and create a favorable environment for students to make better choices. Employers should collaborate with universities to offer internship and training opportunities. At the same time, students should carefully explore their interests and career goals when choosing a university, relying on reliable sources of information.

**APPENDIX 01:**

**SURVEY TABLE ON FACTORS INFLUENCING THE DECISION TO CHOOSE A UNIVERSITY FOR HIGH SCHOOL STUDENTS**

Dear Sir/Madam,

Please provide some information about yourself!

**1. Gender:**

<input type="checkbox"/> <sub>1</sub> Male	<input type="checkbox"/> <sub>2</sub> Female
--	--

**2. You are**

<input type="checkbox"/> 1 High school student	<input type="checkbox"/> 2 Students
--	-------------------------------------

**3. Which high school are you currently/ have you attended?**

- 1. Public school
- 2. Private school
- 3. International affiliated school
- 4. Other

**4. Which academic field are you interested in studying?**

- 1. Economics
- 2. Engineering, Industrial
- 3. Arts
- 4. Other

**5. Current family income (average monthly) (VND)**

- 1. Less than 5 million
- 2. 5 million - less than 10 million
- 3. 10 million - less than 15 million
- 4. 15 million - less than 20 million
- 5. 20 million and above

**6. Study and living location**

- 1. Northern region
- 2. Central region
- 3. Southern region

For each statement below, please select the corresponding numeric value that accurately reflects your opinion on the degree of influence of the following factors on your university choice decision.

Each statement is measured on a scale with equal intervals ranging from 1 to 5, where:

1: Strongly disagree; 2: Disagree; 3: Neutral; 4: Agree; 5: Strongly agree.

Or,

1: Never; 2: Rarely; 3: Occasionally; 4: Frequently; 5: Very frequently.

I)	INDIVIDUAL FACTORS					
1	Parental advice influences my decision in choosing a university.					
2	Advice from friends influences my decision in choosing a university.					

3	Advice from classmates influences my decision in choosing a university.					
4	Advice from alumni influences my decision in choosing a university.					
5	Advice from high school teachers influences my decision in choosing a university.					
6	Advice from current students influences my decision in choosing a university.					
II)	STUDENT-RELATED FACTORS					
7	I choose this university because the field of study aligns with my academic strengths.					
8	I choose this university because I believe I am capable of getting admitted.					
9	I choose this university because the field of study aligns with my personal interests.					
10	I choose this university because I want to continue the program after undergraduate studies.					
III)	FIXED CHARACTERISTICS OF THE UNIVERSITY					
11	I choose this university because it has a reputable and prestigious educational address.					
12	I choose this university because it is conveniently located near my home, facilitating commuting and studying.					
13	I choose this university because it offers diverse and attractive academic programs.					
14	I choose this university because it has modern and well-equipped facilities that serve teaching and learning purposes effectively.					
15	I choose this university because its tuition fees are suitable for my family's financial situation.					
16	I choose this university because it provides scholarships and reasonable financial support policies for enrolled students.					
17	I choose this university because it creates employment opportunities after graduation.					
18	I choose this university because it offers high-income job prospects.					
IV)	COMMUNICATION EFFORTS OF UNIVERSITIES					
19	I choose this university because the university's website provides comprehensive information about the institution.					
20	I choose this university because it organizes counseling sessions for high school students in the admission process.					
21	I choose this university because it arranges campus tours for high school students.					
22	I choose this university because it actively participates in career-oriented educational activities at high schools.					
23	I choose this university because it has excellent admission counseling specialists.					
V)	SOCIAL MEDIA COMMUNICATION FACTORS					
24	I choose this university because I find interesting content about the university on social media platforms related to my interests.					
25	I can easily evaluate the universities I am interested in through social media channels.					
26	Using social media platforms to gather information about the university I am interested in is a common trend.					
27	I enjoy sharing information about the university on social media with my friends.					
VI)	DECISION-MAKING FACTORS FOR UNIVERSITY CHOICE					
28	I am satisfied with the university I have chosen/am currently attending (if you are a student).					
29	I would still choose this university if I had the opportunity to change my decision (if you are a student).					
30	I will recommend this university to students (acquaintances) preparing to take university entrance exams.					

**1. In your opinion, which factor has the most significant impact on your university choice?**

- 1. Influence from influential individuals

- 2. Self-related factors
- 3. Fixed characteristics of the university
- 4. Communication efforts of the university
- 5. Social media communication factors
- 6. Other

**2. Do you have any suggestions for domestic universities to enhance their ability to attract prospective students?**

**Thank you sincerely for taking the time to participate in the survey!**

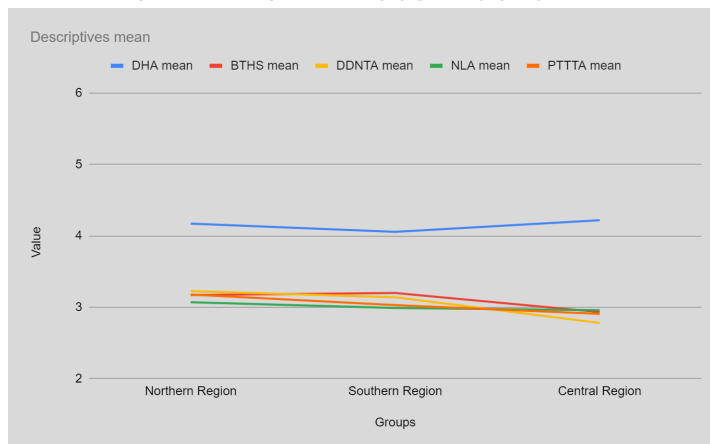
**The research team**

**APPENDIX 02:  
RESULTS OF THE ONE-WAY ANOVA ANALYSIS BY REGION**

Mean_DHA			
Levene Statistic	df1	df2	Sig.
34.369	2	1047	0.000
Mean_BTHSA			
Levene Statistic	df1	df2	Sig.
3.606	2	1047	0.000
Mean_DDNTA			
Levene Statistic	df1	df2	Sig.
33.307	2	1047	0.000
Mean_NLA			
Levene Statistic	df1	df2	Sig.
4.031	2	1047	0.013
Mean_PTTTA			
Levene Statistic	df1	df2	Sig.
11.928	2	1047	0.000

*Source: Research result*

**APPENDIX 03:  
ONE-WAY ANOVA ANALYSIS BY REGION CHART**



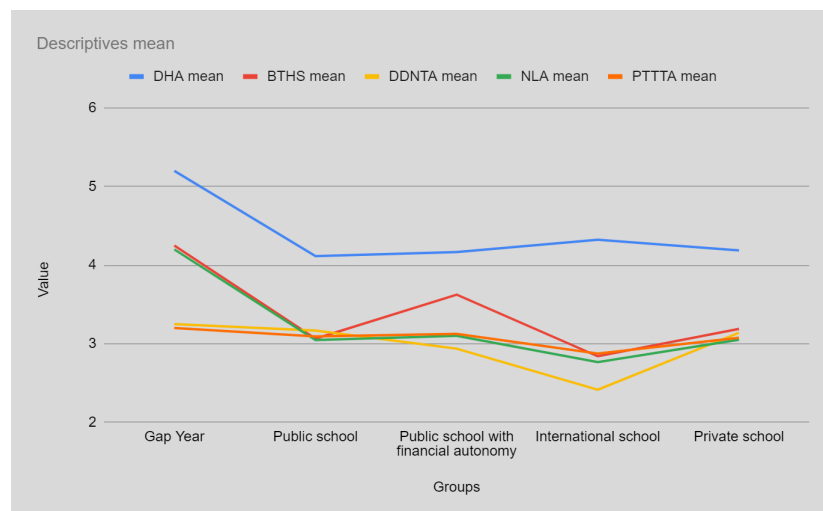
*Source: Research result*

**APPENDIX 04:  
RESULTS OF THE ONE-WAY ANOVA ANALYSIS BY EDUCATIONAL INSTITUTION**

Mean_DHA			
Levene Statistic	df1	df2	Sig.
17.993	2	1047	0.000
Mean_BTHSA			
Levene Statistic	df1	df2	Sig.
3.431	2	1047	0.000
Mean_DDNTA			
Levene Statistic	df1	df2	Sig.
3.252	2	1047	0.000
Mean_NLA			
Levene Statistic	df1	df2	Sig.
2.580	2	1047	0.000
Mean_PTTT			
Levene Statistic	df1	df2	Sig.
8.363	2	1047	0.012

Source: Research result

**APPENDIX 05:  
ONE-WAY ANOVA ANALYSIS BY EDUCATIONAL INSTITUTION CHART**



Source: Research result

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## THE RELATIONSHIP BETWEEN IT STRATEGY, MARKETING STRATEGY, AND OPERATIONAL PERFORMANCE: THE CASE OF TOURISM BUSINESSES IN HANOI

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*ABSTRACT: Nowadays, information technology has a significant impact on all industries, particularly the tourism sector. Significantly, information technology has a close relationship with management activities at some tourism businesses. This paper presents research results on the role of information technology strategy in management activities. This paper examines and evaluates the marketing strategies and operational performance of tourism businesses in Hanoi. The findings further indicated the influence of information technology strategy and marketing strategy on business performance. This result provides useful data for managers to improve their management, thereby enhancing operational performance.*

*Keywords: IT strategy, marketing strategy, operational performance, tourism business.*

### 1. INTRODUCTION

In the scope of Industry 4.0, an increasing number of businesses rely on the massive amount of data and information produced throughout their operations. Traditional methods and platforms, however, are not strong enough to evaluate the structure, identify correlations, and forecast future performance when studying huge data. When making decisions in the real world, where interaction and customer service are key factors, these limitations become challenging (So et al., 2021). The contribution of IT is an effective tool in how to operate, even changing the company model to deal with the enormous amount of data, and the tourism industry is no exception.

According to Greg Oates from Skift, a research firm specializing in economics and tourism, “By integrating IT into online search and booking platforms, hotel and tourism companies are now bringing a lot of real added value to consumers”. Thus, with the development of IT, global tourism activities have undergone great changes. According to statistics, more than 36% of customers can pay more if transactions are easy and there is good interaction, and about 80% of customers prefer to find out information on their own. Understanding and grasping this fact, many travel companies have applied IT technology to find customer sources and improve and enhance the quality of their services. Considering the competitive environment of businesses with huge amounts of data, some businesses find a transition involving corporate strategy that integrates with IT tools. The goal of businesses in the tourism industry is to establish performance and a sustainable competitive advantage.

In reality, IT is considered to be an essential component of a business and is expected to create algorithms to assist travel enterprises in making educated decisions and increase service efficiency.

In recent years, Vietnam has identified tourism as a key economic sector and is taking measures to promote it so that it truly becomes a leading economic sector by 2030. Hanoi, the capital of Vietnam, is always considered one of the most attractive destinations for tourism development because of its existing

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potential. Although the tourism industry in Vietnam in general and in Hanoi, in particular, has seen clear growth and achieved important and encouraging results, the pressure of competition and staying firmly in the market always challenges businesses to constantly improve and enhance the quality of their products and services.

Therefore, investigating the relationship between information technology strategy, marketing strategy, organizational culture, and operational performance is a profoundly practical issue, particularly in the case of tourism businesses in Hanoi.

The study will present the following research objectives and questions:

*Research objective:*

- General objective: To investigate and evaluate the operational performance of tour operators and hotels in Hanoi, as well as to examine the impact of information technology strategy and marketing strategy on the performance of these businesses.

- Specific objective:

+ Systematize the theoretical foundation of IT strategy, marketing strategy, and performance measurement

+ Investigate the impact of IT strategy and marketing strategy on the performance of businesses

+ Based on the research findings, propose recommendations to enhance the performance of businesses

*Research questions:*

To achieve the above objective, the research team focuses on answering the following questions:

- What are IT strategy, marketing strategy, and operational performance? How are they expressed/measured?

- Does the IT strategy have an impact on the marketing strategy? If so, what is the direction and degree of impact?

- Does the IT strategy have an impact on operational performance? If so, what is the direction and degree of impact?

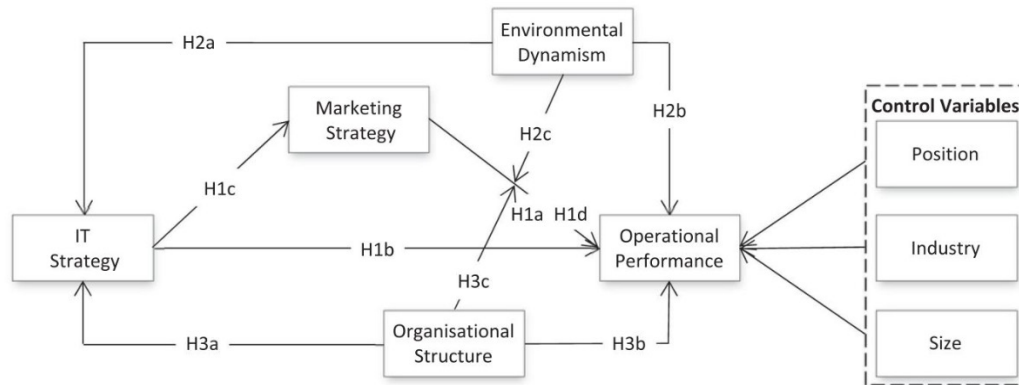
- Does the marketing strategy have an impact on operational performance? If so, what is the direction and degree of impact?

In the following sections, our research team will investigate perspectives on information technology strategy, marketing strategy, and operational performance in tourism businesses in Hanoi. We will also propose a research model based on the examination of theoretical arguments. We will then use data collected from 130 respondents, who are business managers, to test the hypothesis. Subsequently, our research team will discuss the theoretical significance, methodological approach, and practical implications of the findings and synthesize the contributions.

## **2. THEORETICAL FRAMEWORK**

### **2.1. The strategic linkage model to improve Operational Performance of AI - Surmi et al. (2022)**

The strategic linkage model to improve Operational Performance was developed by Al-Surmi et al. in 2022. This study investigates the strategic linkage between marketing strategy and information technology (IT) and provides decision-makers in production and operation with a model to enhance operational performance.



**Figure 1: The strategic linkage model to improve operational performance**

Source: Abdulrahman Al-Surmi et al. (2022)

This model evaluated the linkage between marketing strategy and information technology (IT) in the context of environmental dynamics and organizational structure. The author confirmed that the dynamism of the environment and organizational structure positively impacts operational effectiveness. This is also a different factor of this theory from previous ones (Gartlan and Shanks, 2007; Yeow, Soh, and Hansen, 2018; Al-Surmi, 2016; Cao and Duan, 2019).

## 2.2. IT Strategy

In this paper, we adopted the definition of Gartlan & Shanks (2007): “An IT strategy is a strategic business tool used to structure a future path and addresses the use and management of IT resources, business IT relationships both internal and external and the flow and storage of information throughout the organization”. This definition was synthesized based on the definitions and key IT characteristics from previous studies: Vua, 1978; Henderson & Vankatraman, 1993; Broadbent & Weill, 1993; Gadiesh & Gilbert, 2001...

### 2.1.2. The impact of IT strategy on marketing strategy

According to Henderson (1992) and Venkatraman (2013), regardless of the chosen approach, Marketing and IT need to be coordinated. Literature on information systems (IS) has extensively discussed the necessary fit between the use of IT and the business strategy of the enterprise.

A study in Russia (2018) also showed that IT strategy plays an important role in improving the marketing strategy of enterprises. Technologies such as artificial intelligence, data analytics, digital marketing, and e-commerce have helped enhance the accuracy and predictive capabilities of marketing strategies.

With these positive impacts, the use of IT strategy in marketing strategy is becoming a popular trend and an essential element in modern business, leading to the following hypothesis:

*H1.1: Information technology strategy is positively associated with marketing strategy.*

### 2.1.3. The impact of IT strategy on operational performance

Although technology resources are a prerequisite for IT-supported business processes, IT itself does not directly impact operational performance. According to Melville et al. (2004), operational performance is the effectiveness of business processes. In other words, the presence of technology resources does not lead to increased performance; instead, their utilization will promote performance.”

It can be observed that many studies have shown that IT strategy does not directly impact performance. However, these studies mostly focus on data collection from manufacturing or general businesses.

Conducting research in the service industry, the group found that technology-related decisions have a significant impact on operational performance (Tran Thi Huyen Trang, 2019; Vuong Thao Ly et al., 2022). Therefore, to investigate the relationship between these two factors, we propose the following hypothesis:

*H1.2: Information technology strategy is positively associated with operational performance*

## 2.2. Marketing strategy

In this study, we adopt the definition of Varadarajan (2010): “Marketing strategy can be defined as an organization’s integrated pattern of decisions that specify its crucial choices concerning products, markets, marketing activities, and marketing resources in the creation, communication and/or delivery of products that offer value to customers in exchanges with the organization and thereby enables the organization to achieve specific objectives”. This is a definition that is quite close to the current time and widely used in Varadarajan’s studies (2009, 2015) and by other scholars, such as Morgan et al. (2018).

### 2.2.1. The impact of marketing strategy on operational performance

Varadarajan and Jayachandran (1999), Webster (1992), and Day (1992) affirmed that Marketing strategy is the development of activities and decision-making aimed at building and maintaining a sustainable competitive advantage, bringing superior performance.”

Khaldoon Nusair and colleagues (2019) pointed out that digital marketing strategies such as creating content on social media, online advertising, email marketing, and search engine optimization (SEO) have a positive impact on revenue, profit, and sales growth of businesses. Effective marketing strategies can increase sales revenue, attract new customers (Mohammad Bakhtiar Rana, 2013), and retain existing customers. Therefore, businesses with effective marketing strategies have better financial performance and production efficiency and achieve better competitiveness than those without these strategies (Sabrina Helm, 2015). Therefore, the following hypothesis is proposed:

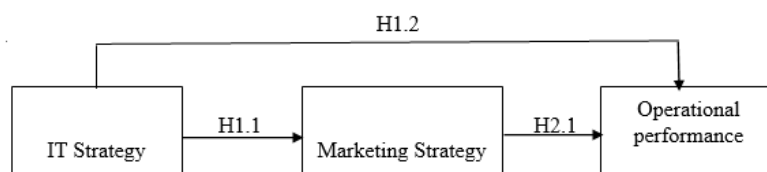
*H2.1: Marketing strategy is positively associated with operational performance*

## 2.3. Operational performance

In later research, Sanchez and Perez (2001) define operational performance as the changes that occur in performance measures after implementing lean manufacturing practices in an organization. Operational performance is a very important metric because it measures an organization’s problems. From a business perspective, the concept of operating performance is often linked to a company’s financial performance.

Iyer (2011) defines operational performance as the actual outcome measured by metrics of quality improvement, efficiency, cost reduction, customer consistency, and on-time delivery of inventory to the organization.

With the stated research scope, this study is based on the theoretical basis of the relationship between the variables “IT strategy,” “marketing strategy,” and “operational performance”. Therefore, the following research model is proposed:



**Figure 2: Proposed research model**

Source: Synthesis research team (2023)

**Hypotheses**

Based on the theoretical basis and qualitative analysis results, the research team proposed two groups of research hypotheses as follows:

*First hypothetical group*

- H1.1: Information technology strategy is positively associated with marketing strategy.
- H1.2: Information technology strategy is positively associated with operational performance.

*Second hypothetical group*

- H2.1: Marketing strategy is positively associated with operational performance.

**3. RESEARCH METHOD**

**3.1. Data collection methods**

*Secondary data collection*

The secondary data used in this study were collected from sources such as books, newspapers, and websites, and mainly from studies on information technology strategy, marketing strategy, operational performance, organizational culture, and related theoretical knowledge.

*Primary data collection*

At the outset, the research team conducted a qualitative study by interviewing four experts in the field of tourism, such as managers, directors, CEOs & Founders, to identify the fundamental relationships between information technology strategy, marketing strategy, operational performance, and organizational culture in enterprises. The purpose was to refine the definition, identify manifestations, and supplement the measurement scale.

Subsequently, the research team collected primary data through a survey using a questionnaire. The questionnaire was designed with clear and easily understandable questions, using a 5-point Likert scale to allow participants to answer according to their thoughts and ensure an acceptable level of reliability. The questionnaire was distributed to the study participants through social media as an online survey from February 23, 2023, to March 08, 2023. The sample size of the survey was 135; after the filtering process, the number of valid responses was 130 (approximately 96.29%).

**3.2. Data analysis methods**

Collected data will be synthesized, cleaned, and analyzed through Microsoft Excel 2016 and SPSS 25.0 software. This study includes descriptive statistics, Cronbach’s alpha reliability test, EFA exploratory factor analysis, Pearson correlation analysis, and regression analysis. Descriptive statistics were used to examine variables of interest, including demographic variables. Analyze Cronbach’s Alpha coefficients to evaluate the reliability of the scales and eliminate inappropriate observed variables. Exploratory factor analysis (EFA) to discover new groups of factors in case they converge with Varimax rotation. Pearson correlation analysis aims to determine certain correlations between variables. Finally, the research team used linear regression to test the accuracy and influence of the original hypotheses in the model.

**Table 1: Survey sample structure**

	<b>Element</b>	<b>Frequency</b>	<b>Ratio</b>
Gender	Men	53	40,76%
	Women	77	59,24%

Age	From 18 to 25	28	21,5%
	From 26 to 35	55	42,4%
	From 36 to 45	41	31,5%
	Above 45	6	4,6%
Position	Head of department	62	47,7%
	Vice president	24	18,5%
	President	23	17,7%
	Manager	8	6,2%
	CEO&Founder	5	3,8%
	Others	8	6,2%

Source: The analysis results of the research team (2023)

### 3.3. Developing a measurement scale

To test the hypotheses, 22 measurements of IT strategy, marketing strategy, and operational performance were synthesized from reference materials. At the same time, the measurement scales were organized, supplemented, and eliminated to fit the characteristics of the tourism industry.

The measurement scale for the IT strategy used in this study was proposed by Al-Surmi (2016, 2022), as it was deemed suitable in terms of research scope and context for tourism businesses in Hanoi. Additionally, after conducting in-depth interviews for qualitative research, the research team proposed three new measurement scales for the factor.

The scale for measuring marketing strategy was evaluated based on the proposals of Al-Surmi (2022) and Ana Maria, Simone & Fernando (2013). Moreover, after conducting qualitative research, the research team also proposed and included 5 additional scales in the model.

The “Operational performance” measurement scale used in this study is based on the scales proposed by Al-Surmi (2022) and Ana Maria, Simone & Fernando (2013) to measure and observe the “Performance” factor with 6 main observed variables, ensuring reliability and values for testing correlations with other factors in the model.

**Table 2: Summary table of measurable scales**

Ordinal numbers	Factors	Symbol	Content	Source
1	IT Strategy	IT1	Our organization uses IT in business processes	Al-Surmi et al. (2022)
2		IT2	Our organization uses IT to support research and development	
3		IT3	Our organization uses IT to support strategic planning and decision-making	
4		IT4	Our organization uses IT for product marketing and promotion	
5		IT5	The use of IT enables my business to ensure the operational integrity of its work	The research team conducted qualitative research and proposed
6		IT6	IT enables my business to resolve issues quickly.	
7		IT7	IT facilitates the monitoring and supervision of my business operations	

8	Marketing strategy	MS1	My business uses online media channels to reach customers	The research team conducted qualitative research and proposed
9		MS2	My business utilizes information and communication technology (ICT) to enhance the customer experience when using our products and services	
10		MS3	My business develops intelligent search tools	
11		MS4	My business conducts data analysis and predicts customer demand	Al-Surmi et al. (2022)
12		MS5	My business is developing an automated chatbot to answer customer questions	The research team conducted qualitative research and proposed
13		MS6	My business is developing a 24/7 customer support service	
14		MS7	My business analyzes the opportunities and challenges from the external environment	Ana Maria Machado Toaldo et al. (2013)
15		MS8	My business considers options and develops a suitable marketing strategy	
16		MS9	My business always focuses on brand management and image across communication channels	
17	Operational Performance	OP1	The sales growth position is much better	Al-Surmi et al. (2022)
18		OP2	The market share gains are much better	
19		OP3	The net profit position is much better	
20		OP4	The financial liquidity position is much better	
21		OP5	Higher return on investment of the business	Ana Maria Machado Toaldo et al. (2013)
22		OP6	Increased customer satisfaction	

Source: The analysis results of the research team (2023)

#### 4. RESULT AND DISCUSSION

##### 4.1. Result

*Testing the reliability of the measurement scale.*

**Table 3: The reliability assessment table of the measurement scale using Cronbach's Alpha coefficient**

STT	Factors	The number of observed variables		Cronbach's Alpha coefficient		Note
		Initial	After validation	Initial	After validation	
1	IT Strategy	7	7	0,899	0,899	No variable exclusion
2	Marketing Strategy	9	9	0,901	0,901	No variable exclusion
3	Operational Performance	6	6	0,868	0,868	No variable exclusion

Source: The analysis results of the research team (2023)

In general, all scales of the factors included in the analysis have relatively high Cronbach's Alpha coefficients and are all >0.7. This means that all scales are reliable and highly suitable for analysis in further analyses.

*The results of the exploratory factor analysis (EFA)*

**Table 4: Results of the rotation matrix**

Rotated Component Matrix <sup>a</sup>			
	Component		
	1	2	3
IT2	,857		



IT1	,836		
IT5	,760		
IT7	,744		
IT3	,740		
IT6	,652		
OP4		,775	
OP2		,764	
OP1		,695	
OP3		,694	
OP5		,692	
MS3			,855
MS8			,762
MS1			,751
MS4			,722
MS7			,652
MS9			,611
Extraction Method: Principal Component Analysis.			
Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 8 iterations.			

Source: The analysis results of the research team (2023)

The factors retain their original concepts and only remove poor variables, including:

- Operational performance consisting of observed variables: OP1, OP2, OP3, OP4, OP5. Abbreviated as OP.
- Information technology strategy consisting of observed variables: IT1, IT2, IT3, IT5, IT6, IT7. Abbreviated as IT.
- Marketing strategy consisting of observed variables: MS1, MS3, MS4, MS7, MS8, MS9. Abbreviated as MS.

*The result of Pearson correlation analysis*

**Table 5: The correlation between factors**

Correlations				
		IT	OP	MS
IT	Pearson Correlation	1	,514**	,372**
	Sig. (2-tailed)		,000	,000
	N	130	130	130
OP	Pearson Correlation	,514**	1	,472**
	Sig. (2-tailed)	,000		,000
	N	130	130	130
MS	Pearson Correlation	,372**	,472**	1
	Sig. (2-tailed)	,000	,000	
	N	130	130	130
**. Correlation is significant at the 0.01 level (2-tailed).				

Source: The analysis results of the research team (2023)

The correlation coefficients of the variables “IT Strategy” and “Marketing Strategy” with the variable “Operational Performance” are 0.514 and 0.472, respectively, at a significance level of 1%, indicating a fairly strong positive correlation between these independent variables and the dependent variable.

The results of multiple linear regression analysis

**Table 6: The linear regression coefficients of factors affecting marketing strategy (MS)**

Model		Coefficients <sup>a</sup>					Collinearity Statistics	
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Tolerance	VIF
		B	Std. Error	Beta				
1	(Constant)	2,058	,577		3,570	,001		
	IT	,434	,143	,431	1,634	,000	,663	1,509

a. Dependent Variable: MS

Source: The analysis results of the research team (2023)

The Sig coefficient of the independent variable IT (IT Strategy) is less than 0.01, indicating statistical significance at the 1% level.

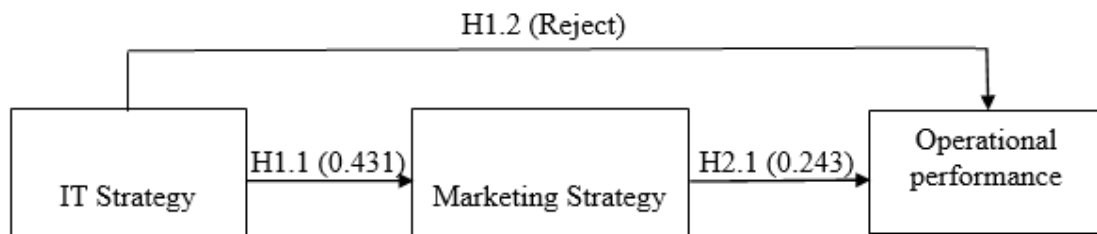
**Bảng 7: The linear regression of factors influencing operational performance (OP)**

Model		Coefficients <sup>a</sup>					Collinearity Statistics	
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Tolerance	VIF
		B	Std. Error	Beta				
1	(Constant)	,665	,335		1,383	,172		
	IT	,159	,077	,165	1,429	,158	,635	1,574
	MS	,231	,067	,243	2,392	,001	,823	1,215

a. Dependent Variable: OP

Source: The analysis results of the research team (2023)

The variable MS (Marketing Strategy) has a significance level of Sig = 0.01 < 0.05, indicating that it has statistically significant meaning at a 5% level of significance. However, the variable IT (IT Strategy) has a coefficient of Sig. = 0.158 > 0.05, indicating that it is not significant in the regression model, or other words, it does not have an impact on the dependent variable OP (Operational Performance).



**Figure 3: Research adjustment model**

Source: The calculations by the research team (2023)

**4.2. Discussion**

Through the synthesis and examination of previous research and the application of research to practical situations in Vietnam, as well as careful attention to the translation, in addition to using a linear regression model, our research team developed a scale of questions to measure the impact of information technology strategy, marketing strategy, organizational culture, and operational performance. The scale ensures reliability and validity, with all question components correlating well with the overall variable, demonstrating the suitability of the scale chosen by our research team. Therefore, the report will summarize the impact of each pair of variables in the research model.

The regression analysis results show that the IT strategy has a positive impact on the marketing strategy. When the IT strategy increases by 1 unit, the marketing strategy increases by 0.431 units. The stronger the IT strategy is applied, the more the marketing strategy is enhanced.

Through the results of the regression analysis, the research team concluded that the IT strategy did not have an impact on operational performance, with a Sig coefficient of  $0.158 > 0.05$ . In the general economic and production sectors, some industries apply IT strategies to production, in which case the IT strategy can have a direct impact on operational performance. However, in the specific tourism industry, this relationship does not have a direct impact but rather relies on other relationships to indirectly impact and increase operational performance, such as marketing strategies.

Based on the table of regression results, the research team concluded that the marketing strategy has a positive impact on performance. For each unit increase in the marketing strategy, the performance increases by 0.243 units. However, the level of impact is the lowest in the model.

## 5. CONCLUSION

Through a comprehensive review of research studies, the study has systematized the fundamental issues of IT strategy, marketing strategy, and performance based on the foundational theory of “strategic link theory for improving operational performance”. As a result, the research team discovered research gaps in identifying influential factors and laying the groundwork for building a research model in the report. By combining two qualitative research methods (in-depth interviews with four experts) and quantitative surveys with a sample size of 130 (analyzing linear regression equations), the research results showed that the model fit the market survey data perfectly and drew conclusions about the hypotheses of the relationships between the factors. Furthermore, the study also identified whether the factors had a positive or negative impact, whether they influenced each other, whether they were in the same direction or the opposite direction, and whether their impact was strong or weak on the operational performance of tourism businesses in Hanoi.

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## PEER PRESSURE AND OTHER FACTORS AFFECTING VIETNAMESE PARENTS' INTENTION FOR THEIR CHILDREN TO TAKE THE INTERNATIONAL ENGLISH CERTIFICATE EXAMINATION

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**ABSTRACT:** Vietnamese parents appear to be “rushing” their children to take the International English Certification Exam (IECE), especially in large cities. Is sending the child to take IECs just a social trend or a way to help them access the global learning environment? The purpose of this article is to analyze the factors influencing parents’ decisions to give these exams to their children. The research model was built based on a research overview and adjusted to fit the research problem and context through in-depth interviews and preliminary quantitative research. Analyses using Cronbach’s Alpha, EFA, and linear regression were performed on the formal quantitative research, which included responses from 351 Vietnamese parents. The findings indicate that four factors have an impact on Parents’ Intentions for their children to take the IECE (INT), with Peer Pressure (PP) and the Social Comparison (SC) having the two biggest impacts.

**Keywords:** International English Certification Exam (IECE), peer pressure, intention, parents, Vietnam

### 1. INTRODUCTION

The process of social integration has been penetrating the economy, politics, culture, and society of countries; it affects all aspects of human life and gives us many development opportunities. In that context, English has become an indispensable tool on the tin way of international integration as a means of communication between countries. Especially in the context of growing international trade; investment funds and foreign corporations have flocked to Vietnam, bringing career opportunities for Vietnamese people. Using English fluently will help each develop their professional capacity; creating opportunities to access and exploit the most technological achievements in the world. English is playing an extremely important role, directly affecting the success of many individuals and organizations, and has a close relationship with the development of a country.

More and more people are interested in improving their English ability and actively studying and registering for the International English Language Certificate (IECE). The recognition of many organizations for certificates such as IELTS, TOEIC, TOEFL, SAT, APTIS, Cambridge ESOL... is becoming increasingly obvious. These certificates are not only proof of the exact level and ability to use English, but they are also considered a “golden passport” to help young people exchange and integrate internationally. In recent years, IECE is gradually becoming popular among students and high school students in Vietnam. In addition, the enrollment policy in combination with IECE is becoming a popular trend at the top universities in Vietnam (Anh, 2022). Vietnamese parents are increasingly allowing their children to take IECs in recent years, especially whether they’re in high school or college (Lien, 2023; Quyen, 2022). Many Vietnamese parents desire to create the finest conditions for their children’s development. They expected that if their children

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have IECEs then, they can access advanced education easily, have great advantages in the future such as exemption from national graduation exams, improve their chances of being admitted to higher education institutions, increase their chances of getting a job with good remuneration (Yusupov et al., 2022; Nhat Le, 2021; Anh et al., 2020; Nhut and Vinh, 2014). It shows that Vietnamese society is increasingly interested in learning foreign languages. However, is that just a short-term trend? Does letting children take the IECE come entirely from the objective requirements of society or the subjective point of view of parents?

There are currently a lot of domestic and international studies on the intentions and behavior of students to take IECE, but there is a lack of research on their parents'. Most of the previous studies have focused mainly on students who are about to graduate or are working people who need to take language, computer, or accounting certificates to meet their job needs (Cui et al., 2018; An et al., 2021; Hang and Mai, 2022). Therefore, it is necessary to research parents because they play a crucial role in orienting their children's futures while also serving as the primary source of funding for their children's study and exam needs. The authors chose the research topic "Peer Pressure and other factors affecting the intention of Vietnamese parents for their children to take the International English Certificate Exam". The purpose of this study was to identify the extent to which various factors affected parents' intentions to require their children to take the IECE in Vietnam. Based on an overview to build a research model, in-depth interviews to complete the scale, and a questionnaire, a quantitative study with 351 parents was conducted to test the hypotheses posed in the research model. To better understand the impact of Peer Pressure (PP), and Enrollment Policy (EP) on Vietnamese parents' decisions to allow their children to take the IECE (INT), the conclusions drawn from the research results are presented. The outcomes of those studies are shown in the following sections.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Parents' Intention for their children to take the IECE**

Intentions to invest in children's education, such as studying abroad or taking international English exams, are seen as forms of consumer intent (Chen and Zimitat, 2006). This is an expensive educational option and requires a lot of preparation, including tuition fees, retest fees, and exam fees to be borne by the student's parents and student. As a result, educational decisions always have a significant impact on the lives of families. This is therefore one of the most complex decisions faced by families (Mazzarol, 1998).

Parents play an important role in the educational selection process for their children, especially during the transition from one educational setting to another. Parents are also seen and evaluated from the perspective of those who have a great influence on their children's future educational and career orientation (Sharif et al., 2019). Studies on children's intellectual and occupational development show that children are more likely to be influenced by their maternal (Rani, 2014; O'brien et al., 2000) and paternal (Allen & Daly, 2007; Agarwala, 2008) influences.

Parents' decisions about their children's education are always influenced by many factors, not just the decision to send their children to the exam. These factors may be due to changes in educational policies and social development goals. But it can also come from the parents' level of knowledge, experience, and subjective will.

This issue should have been explored in depth, but studies on the Intention to take the International English Certificate Exam are few and far between. Studies tend to survey students at a young age, on a small scale with a group of university students (Nhut and Vinh, 2014; Vu, 2017), or with international professional and academic certificates (Hang, 2022; An et al., 2021). In the context of the internationalization of education and the current explosive trend of children taking the test, the authors focus on researching and

measuring the impact of factors on Parents' Intentions for their children to take the International English Certification Exams.

## 2.2. Research model

### Peer Pressure (PP)

Several studies have shown that peer pressure is a factor that drives individuals' intentions to do what their friends and colleagues do (Cook & Dayley, 2001). Humans are very social creatures, so they spend most of their lives interacting with each other and building close relationships to compete with each other and thrive together (Brown, 1982). Thus, peer pressure creates the intention to take specific actions to keep up with peers. Peer pressure plays an important role in changing people's behavioral intentions and motivating people to do something.

For parents, peer pressure is understood as pressure from people of parents' age or social class in caring for and educating their children. This causes parents to feel pressure to meet or exceed social standards, place high expectations on their children to meet those standards, and this pressure can even be passed on to their children. From having intentions and making decisions about the parenting and direction of children, and comparing intentions and behaviors with the intentions and behaviors of other parents, parents find out what is best for children (Quyen, 2022). Even if they're not sure it's the right thing for their child, they may still attempt these behaviors under social pressure from friends, to pass a test, or compare themselves to peers. These pressures can influence a parent's intention for their children to take the IECE. Therefore, the authors propose the following hypothesis:

*H1: Peer Pressure has a phase impact on Parents' Intention for their children to take the IECE*

### Enrollment Policy (EP)

Hang (2022) said that Vietnam is gradually using English certificates to consider university degrees and university admissions due to the influence of the demand for international education integration. Using the IECE is not only a basis for assessing a candidate's current English level but also a "door" that opens up excellent study and work opportunities and attracts employers with their profile and skills (Minh, 2021). In addition to the support of the Ministry of Education and Training, the exam organizer will also ensure the quality of training, and the quality of the exam to further promote the use of the IECE for many purposes, and this seems to encourage parents and students to use IECE more often. Hypothesis H3 is proposed:

*H2: Enrollment Policy have a positive impact on Parents' Intention for their children to take the IECE*

### Social Comparison (SC)

According to Festinger's (1954) theory of social comparison, people always tend to compare themselves with others. This is also considered a common and basic feature of collective life. People compare themselves to members of their groups, compare themselves to people in other groups, and compare their groups to other groups. From these comparisons emerge norms, massive groups, group structures, and intergroup relationships, which form a framework for group-based social comparisons. Comparing one to friends and colleagues can create invisible pressures that can influence one's intentions and actions. This is easily seen in the Vietnamese educational environment (Huong, 2019; Anh, 2016). Parents compare their children with other children based on many criteria such as grades, awards, and achievements in extracurricular activities,... When parents realize their child is inferior in some aspects, they may feel pressured and thereby motivate their children to work. That means studying, taking more tests, and investing in learning to improve the score. Therefore, the following hypothesis is proposed:

*H3: Social Comparison has a positive impact on Parents' Peer Pressure on Intention for their children to take the IECE*

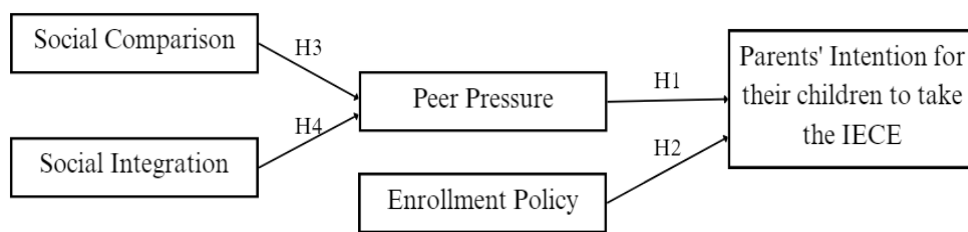
**Social Integration (SI)**

Boer et al. (2017) asserts that acceptance in society, especially among friends and colleagues, plays an important role in each person's life. In addition, the fear of social rejection and the desire to express themselves puts pressure on both adolescents and adults. They feel obligated to conform to the standards and expectations of the social group they belong to, the peer group that needs to be cared for, respected, and loved, thereby creating an invisible pressure for themselves. From this theme, the need for social interaction can be explored not only by meeting the standards expected by social groups, but also by the parent's desire to help their children interact better in the international community, job opportunities, and later. This notion puts many parents under pressure when it comes to making decisions about their children's education. Therefore, the authors propose the hypothesis:

*H4: Social Integration has a positive impact on Parents' Peer Pressure on Intention for their children to take the IECE*

With the above hypotheses, the following research model was formed:

**Figure 1: Proposed research model**



**3. RESEARCH METHOD**

The authors created a research model and scale through theoretical analysis and examination of multiple studies. To finalize the scales and survey questionnaire, they conducted qualitative research, consisting of in-depth interviews with six experts in education and psychology. The purpose of these interviews was to enhance the measurement scales and develop a quantitative questionnaire. The authors revised the scales based on the experts' feedback to align with respondents' understanding and adjusted the logic of each scale to ensure students can comprehend the research problem.

After editing the questionnaire based on expert feedback, the research team distributed it to parents at high schools and universities in Ha Noi, Hai Phong, Da Nang, Vung Tau, and Ho Chi Minh City. Using convenience sampling, the survey targeted parents with children attending high schools and universities in Vietnam. Out of the 364 responses received, 351 were deemed objective and provided sufficient information for the next research steps. Interestingly, none of the respondents chose the option "Not intending to let my children take the test," indicating a unanimous intention among parents for their children to participate in the test. 49.9% of parents are preparing their children for the IECE exam, while 31.1% have already sent their children to take the test, and 19.1% have plans but haven't allowed their children to take the test yet. The survey received more responses from mothers (51.3%) than fathers (48.7%), but there was no gender discrimination. The majority of parents (34.5%) fall in the age range of 46 to 50. Age ranges 41 to 45 and 51 to 55 each makeup 25.5% and 19.9% of parents, respectively. Most parents have graduated with a



bachelor's degree (51.6%), followed by those with a graduate degree (23.4%) and a college degree (17.7%). A minority has a high school education or less. In terms of income, the majority of parents (70.1%) earn between 7.5 million and less than 30 million per month. Within this range, 33.9% earn between 7.5 million and less than 15 million, and 36.2% earn between 15 million and under 30 million. 13.1% of parents have an income of over 30 million, and the rest earn less than 7.5 million per month.

Finally, the scales are coded and SPSS 26.0 software is used to perform data analysis steps such as Cronbach's Alpha coefficient analysis, CFA analysis, and multiple linear regression analysis to help understand trends, and the research hypothesis tested.

## 4. RESULTS AND DISCUSSION

### 4.1. Cronbach's Alpha analysis

**Table 1. Results of verifying the reliability of the scale**

Factor	Cronbach's Alpha coefficient	Cronbach's Alpha if the item deleted	Number of variables removed
Peer Pressure (PP)	0.921	0.671 - 0.746	0/9
Social Comparison (SC)	0.893	0.654 - 0.771	0/3
Social Integration (SI)	0.904	0.704 - 0.784	0/6
Enrollment Policy (EP)	0.886	0.677 - 0.788	0/4
Parents' Intention for their children to take the IECE (INT)	0.860	0.623 - 0.720	0/5

*Source: Summary of the research team's results, 2023*

Cronbach Alpha test was performed to remove the scales that are not reliable enough. The findings indicate that all variables have dependable Cronbach Alpha coefficients ( $>0.6$ ), with peer pressure and the need for social integration showing particularly strong coefficients ( $>0.9$ ). According to Nunnally (1978), all the scales met the required level with the correlation coefficients of the total variables in the scales reaching the required level ( $>0.3$ ).

### 4.2. Confirmatory factor analysis (CFA) results

**Table 2: Model Fit Rating Index**

	Index	Access
CMIN/DF	2.358	Good ( $< 3$ )
GFI	0.863	Acceptable ( $>0.8$ )
CFI	0.934	Good ( $>0.9$ )
TLI	0.925	Good ( $>0.9$ )
RMSEA	0.062	Good ( $<0.08$ )

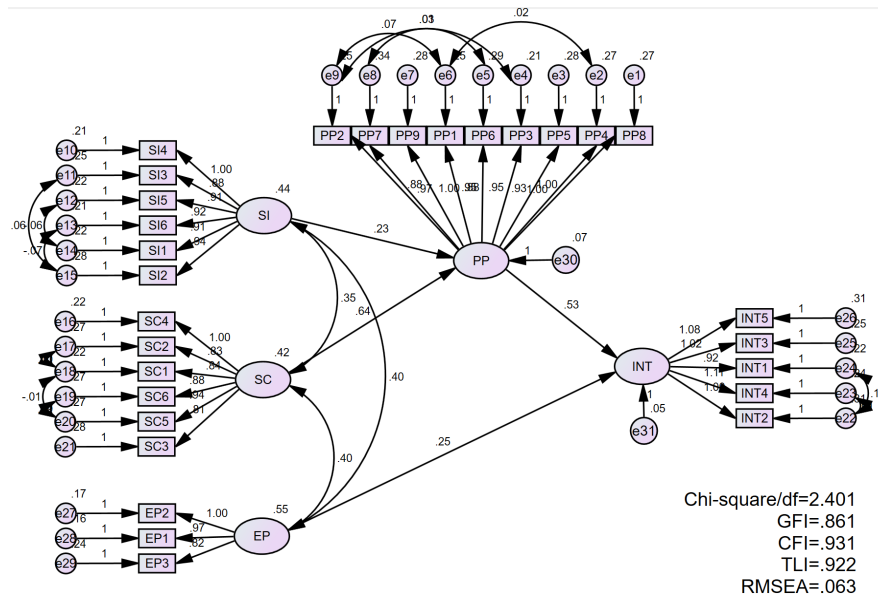
*Source: Summary of the research team's results, 2023*

The above results show that: Chi-Square/df coefficient (CMIN/df) is 2,358 ( $< 3$ ), GFI = 0.863 ( $>0.8$ ), CFI = 0.934 ( $>0.9$ ), TLI = 0.925 ( $>0.9$ ), RMSEA = 0.062 ( $< 0.08$ ). Therefore, the model is suitable for the research data, the values are satisfactory, good, and meaningful for the study.

### 4.3. Structural Equation Modeling (SEM) analysis

The research team performed the SEM Structural Model analysis to analyze the multi-dimensional relationship between the dependent variable "Parents' Intention for their children to take the IECE" (INT) and other variables in the model. The group used a significance level of 5% for this statistical method. The results from the analysis are presented below:

Figure 2: SEM results with the model without control variables



Source: Summary of the research team’s results, 2023

**Evaluate the fitness of the SEM model:**

The Model Fit results in the SEM model once again confirm the appropriate correlation between the research model and the actual data. The research model is completely built according to the theory and has enough grounds to evaluate reality. The indicators are shown in Table 4:

Table 3: Model Fit for SEM Model

	Index	Access
CMIN/DF	2.401	Good (< 3)
GFI	0.861	Acceptable (>0,8)
CFI	0,931	Good (>0,9)
TLI	0.922	Good (>0,9)
RMSEA	0.063	Good (<0.08)

Source: Summary of the research team’s results, 2023

**Test hypotheses and evaluate the impact direction:**

The P-Value index of all variables is < 0.01, reaching a 99% confidence level, so the impact relationships of the independent variable on the dependent variable are all significant. With the results obtained from the SEM analysis, the proposed hypotheses are accepted.

Table 4: Summary of SEM Results

Hypotheses (Hs)		Unstandardized Estimate	P-Value (Sig)	Results
H1	INT ← PP	0.53	***	Accepted
H2	INT ← EP	0.25	***	Accepted
H3	INT ← SC	0.64	***	Accepted
H4	INT ← SI	0.23	***	Accepted

Source: Summary of the research team’s results, 2023

**In terms of the impact relationship**, the Unstandardized Estimate has positive values, showing that the independent variables have a positive impact on the dependent variable.

**In terms of the order of effects**, this coefficient indicates the level of impact from strongest to lowest among variables.

For the dependent variable Peer Pressure (PP), Social Comparison (SC) is the factor that has the strongest impact on this dependent variable, followed by Social Integration (SI).

For the dependent variable Parents' Intention for their children to take the IECE (INT), Peer Pressure (PP) has the strongest influence, followed by Enrollment Policy (EP) which is the factor that has less influence on Parents' Intention for their children to take the IECE.

**In terms of impact level**, Social Comparison (SC) is the factor that has the strongest impact on Peer Pressure (PP) with an impact level of 64%, followed by Social Integration (SI), associated with an influence level of 23%. For the dependent variable INT, Peer Pressure (PP) with the probability of impact is 53%. Another factor that had little impact on Parents' Intentions, the Enrollment Policy (EP) also explained 25% of Parents' Intention for their children to take the IECE.

## **5. CONCLUSION AND RECOMMENDATIONS**

### **5.1. Letting children take the IECE should be an integration promotion instead of a trend**

Firstly, Schools and educational institutions should include international English language certification exams in their language curriculum. This can be achieved by offering preparation courses for these exams or integrating exam preparation materials into existing language classes. Teachers and educators can also motivate students by emphasizing the benefits of certification, such as increased job opportunities and the ability to study abroad.

Parents also play an active role in motivating their children ahead of these exams and encouraging their children to improve their language skills. Parents can support their children by providing opportunities for them to practice their English, such as enrolling them in language courses such as TOEFL or IELTS. This is a useful way to promote integration and enhance opportunities for students in an increasingly globalized world. Or give them access to English resources.

In addition, governments and policymakers support language education, especially in countries where English is not the primary language. This could include increasing funding for language programs in schools, promoting language exchanges between countries, and encouraging certified language teachers to teach international English language certification e.g....

Finally, it's important to remember that these exams should not be viewed as a trend or a contest. Instead, they should be viewed as a tool to help the child achieve academic and career goals. It's also important to make sure that the child is taking the exam for the right reasons and that they don't experience undue pressure or stress in doing so. By implementing these recommendations, we can ensure that taking international English language certification exams becomes a driver for integration and language proficiency, rather than just a trend.

### **5.2. Remaining inadequacies in education policy in Vietnam**

In 2022, the Vietnamese Education Electronic Journal also identified 10 existing issues and shortcomings in education, including:

Inadequate regulations on teacher appointment and salary ranking contribute to complex and costly processes for teachers. Outdated rules still determine their salaries. Nationwide teacher shortages, especially

in early childhood education, amount to 44,000 teachers, posing a significant challenge. Low incomes and unresolved pressures make it difficult to attract education students, hindering the recruitment target of 27,850 teaching positions. Urgent attention is needed for long-term fixed-term contracts with low salaries and a lack of benefits for some teachers.

Despite the teacher shortage, a considerable number of teachers have quit due to heavy workloads and low incomes. Unusually, 29,000 teachers resigned in 2021 and 2022 during the implementation of new programs and experienced teacher shortages. The education sector faces the challenge of simultaneously recruiting and reducing teaching positions by 10%, exacerbating the teacher shortage problem. Integrating teachers is complicated due to the introduction of new subjects and integrated courses, and no effective solution has been found.

The implementation of the new program allowing students to choose subject combinations is impractical. Schools are responsible for creating subject combinations, forcing students to choose from predetermined options regardless of their preferences. This leads to incorrect choices and a lack of guidance on transferring schools or exploring alternative learning options. Documentation and paperwork for the new program remain burdensome, with lengthy attachments and paperwork that have not been streamlined. High school testing methods have become overly formalistic and inappropriate with extensive specifications. Localities set increasingly higher achievement targets each year, resulting in heightened pressure and excessive focus on grades. Moreover, school violence has become more prevalent after a period of online learning, with instances of teacher-on-student incidents.

### **5.3. Being aware of the obligations parents have and what to perform**

**Social Comparison (SC)** was the most influential factor, with the ability to explain about 64% of influence to peer pressure. This was also mentioned by Festinger (1954) in the theory of social comparison, he said that people always tend to compare themselves with others and this can create pressure for themselves. This is also considered a common and fundamental feature of group life. People compare themselves to members of groups, they compare themselves to people in other groups, and they compare their groups to other groups. From these comparisons emerge, normative groups, group structures, and intergroup relationships, which in turn provide a framework for group-based social comparisons. Comparing friends and colleagues can create invisible pressures on parents, thereby affecting an individual's intentions and behavior. Therefore, in the context of the study, the authors found that the more parents tend to compare their children with the children of friends and colleagues, the more pressure they feel. This comparison is shown in such aspects as comparing the child's learning abilities and preparation for the exam with other parents' children; comparing the current English ability of children with other parents; comparing the child's achievements with the children of other parents. Parents are also under peer pressure when trying to find out and compare how other parents have their children review and take the exam to choose the most appropriate method to support their child. In addition, when receiving the results of their child's IECE test lower than that of their peers, parents need to re-evaluate the entire learning process to come up with solutions to "patch" their child's knowledge gaps, help children get better test results next time instead of comparing their scores with other parents' children, leading to pressure and anxiety. Therefore, when they see other students and students taking the exam, they also want their children to study for the exam and achieve the best results.

**Peer Pressure (PP)** is the second strongest factor affecting the Parents' Intention for their children to take the IECE (53%). In essence, this factor can be a form of pressure, but it is also a form of motivation for parents to learn and discover the most effective ways and methods of learning to educate and accompany as well as help their children during the IECE. For these pressures not to become a burden, parents need to:

Receive information frequently about letting children positively take the test from friends, contributing to reducing peer pressure. At the same time, it is necessary to have the right attitude when receiving accurate and regularly updated information from colleagues and friends about letting children take the exam to turn it into motivation to help the process of receiving new information faster and more accurately. When referring to the advice of colleagues and friends about letting their children take the exam, parents should constantly learn and receive information correctly, avoiding the situation of “overeating” information that causes pressure. unnecessary, affecting the process of receiving information transparently.

Parents should consider the ability and learning ability as well as the suitability of their children before making decisions for their children to take the exam to eliminate the possibility of undesirable results and help their children to choose the suitable type of certificate for exam preparation, and achieving the best results. In addition, parents need to understand their children better instead of just caring about what others think about their child’s score results to reduce peer pressure and stress for themselves and spend more time with their children. Spend time focusing and caring for children during the process of giving them the exam.

In addition, it is necessary to carefully access the information about the centers and certificates, avoid following the crowd when getting peer pressure from colleagues as well as from people around, leading to the wrong decision when sending their children to learning centers and taking the IECEs.

Next, **Education Policy (PE)** is the factor that affects the Parents’ Intention for their children to take the IECE at 25%. The scales have all returned feedback that parents find that domestic educational institutions give priority to enrolling candidates who possess international standards, and foreign educational institutions sometimes require candidates to possess IECE for admission. And in addition, all units and agencies give priority to recruiting candidates who possess international standards, from which it is clear that having children with international standards is a great advantage in many levels of education, employment, and society in the future. At present, even if there are no educational policies that require degrees and certificates, it is still necessary for parents to let children study and take English exams - the world’s common language. Parents need to have the right awareness about letting their children take the IECE because it is not only used for enrollment and exchange of points, but more deeply, it helps children have the opportunity to access international languages from early, helps children better integrate into the global environment, and at the same time increase job opportunities and future career development.

**Social Integration (SI)** is the last factor that explains only 23% of parents’ peer pressure. Boer et al. (2017) also confirmed that the acceptance of society, especially friends and colleagues, plays an important role in each person’s life, with parents as an example. In addition, concerns about society’s rejection of children and their children’s desire to express themselves create certain pressures for both adolescents and parents. They feel obligated to conform to the standards and expectations of the social group they belong to and the peer group to be cared for, respected, and praised, thereby creating invisible pressures for the parents. For their children to be able to study in an international quality educational environment, participate in activities of international organizations, or simply easily adapt to a variety of living and working environments in the future, parents need to have an attitude that does not hesitate to let their children take the IECE, to supplement and equip their children with essential skills.

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## BEAUTY VIRTUAL TRY-ON: HOW AUGMENTED REALITY INCREASES PURCHASE INTENTION THROUGH ITS IMPACT ON CUSTOMER EXPERIENCE

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**ABSTRACT:** *In the era where the beauty industry has undergone a significant transformation, thanks to technical breakthroughs, Augmented Reality (AR) has evolved rapidly in the past decade as a simple technology to use on practically any device, especially in the context of beauty businesses experimenting with innovative approaches to respond to customer demands through AR solutions (e.g., virtual try-on technology) with an effort to promote brand awareness and consumer interest in the brands. Drawing upon the Stimulus-Organism-Response framework, this study proposes a research model that can explain the chain of effects from the AR experiential attributes (i.e., AR interactivity, AR vividness and AR reality congruence) through customer experience (i.e., perceived personalization and self variety-seeking) towards serial paths of purchase intention of beauty products from customer perspective in the beauty context. Results based on a sample of 300 customers show that the AR attributes positively affect customer experience in using AR beauty try-on applications, in turn enhancing purchase intention of the beauty products illustrated in the apps.*

**Keywords:** *AR beauty try-on applications; augmented reality attributes; customer experience; purchase intention; S-O-R model.*

### 1. INTRODUCTION

Retailing is expanding more quickly as a result of advancements made possible by new technologies (Grewal et al., 2017), from same-day delivery on mobile purchase to AI-powered forecasting as a post-pandemic leverage. Lately, acknowledging digital as the “only door to the world”, with augmented reality (AR), customers now access proactive interactions while saving time for fitting and cash on transportation in daily categories (e.g. sneakers, furniture, make-up products, etc.). Accordingly, with such advancements enhancing AR-based apps, this promising 198-billion-dollar market (Statista, 2022) is estimated to spread this adaptation extensively to industrial manufacturing and even medical treatment. Correspondingly, implementing the AR-based innovations in the beauty industry, yet still a relatively new concept, is potentially gaining extensive traction since users are unlimited to virtually ‘try’ hundreds of beauty products and later make choices owing to preferences. Vietnam, still in the early phases of implementing AR technology in trade, with the pioneering of e-commerce platforms to bridge the online and physical shopping divide, has also witnessed leading beauty companies such as L’Oreal, Estee Lauder or Shu Uemura to use virtual try-on technology for high-end segment products on grand platforms, obtaining results surpassing expectations profitably with a consistent increased traffic, where orders of virtual beauty try-on products had a conversion rate that was three times greater than others (Tran and Nguyen, 2022).

From above arguments, it is evidently stated that AR applications are growing as an accessible yet feasible marketing tool in a wide range of industries, including the beauty sector in Vietnam’s developing market. However, along with the light of customers’ contributions to a growth of 513% in research volume about online shopping (Mendonca, 2022), little research has been done on the impacts of customer experience on purchase intention while using AR-based features in Vietnam. Consequently, this research aims to investigate core experiential attributes of AR beauty try-on applications, examining how purchasing beauty products online compromises consumers’ shopping experience and their perception of items while AR features are

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involved through the utilization of Stimulus-Organism-Response (S-O-R) model. More specifically, the study places emphasis on the importance of self-congruence regarding augmented visualizations that reflect one's ideal appearance as an influence on consumers' inclination for self variety-seeking. Through presenting the current users' perceptions of these technologies within the S-O-R framework, this research also attempts to bring new improvement plans and suggestions for this optimizing tool of marketing, later contributing to the literature on the implementation of AR beauty try-on applications in the beauty industry.

## 2. THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

### 2.1. Theoretical framework

#### 2.1.1. Augmented reality (AR) in beauty industry context

With augmented reality, users can virtually “try” hundreds of beauty products and later make choices based on their preferences. This convenience, in accordance with the theoretical assumptions of AR technology enhancing customer buying experiences across a variety of omni-channels (Manis and Choi, 2019), and, a survey of Joshi (2019) indicated that AR emerges in providing a ‘try-before-you-buy’ option for consumer where 40% of people are willing to pay more for a product if they can try it out initially through AR (e.g. e-commerce platforms), it is likely that AR applications are a feasible and successful marketing tool in a variety of industries, including the beauty sector, especially in developing markets like Vietnam.

#### 2.1.1. Theory of S-O-R model

The S-O-R model, as a theoretical foundation for consumer behavior research, does not simply relate to psychological contexts but also contributes as an analysis of a proven theory in management information systems for assessing user behavior. For instance, in the context of consumer behaviors, it is proposed that the S-O-R paradigm can assist retailers in pinpointing the exterior stimuli that need manipulating in order to elicit consumers' internal thoughts and behavioral exhibitions (Hsu et al., 2021). Recently, this framework has been notably applied to research the varied influences of mobile AR app attributes or features on users' behaviors. Correspondingly, the S-O-R model is regularly utilized in this study as an important analytical framework to anticipate the cognitive judgment and subsequent action or intention of a group of specific users in terms of explaining the process of human behavior, particularly in the context of using AR beauty try-on applications, where the S-O-R theoretical framework could be relevantly utilized to investigate experience through AR app features as external stimuli, and examine the role of cognitive and affective responses to experiential AR app features in customers' purchase intention subsequently.

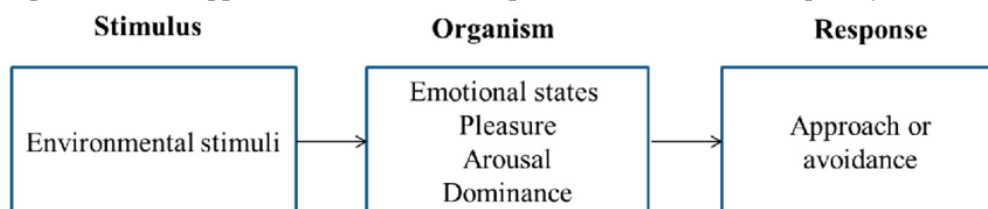


Figure 1. Stimulus-Organism-Response (S-O-R) Model

### 2.2. Hypothesis development

#### 2.2.1. The influences of AR attributes on customer experience

##### The influence of AR interactivity on customer experience

Interactivity, commonly referred to “customizing the user interface and graphics to each user's demand” (Albashrawi and Motiwalla, 2015), is considered a crucial component in the beauty industry context for assisting customers in obtaining more information during the shopping process at ease, thus

promoting the timely exchange of relevant information. Relatedly, this is in consonance with the discussion about the relationship between interactivity features and perceived personalization, which assumes that interactivity and the high levels of personalization can result in favorable consumer reactions (Song and Zinkhan, 2008) since the better performance of interactivity in two-way communication setting consisting of navigation and responsiveness, the higher sense of controllability consumers perceive in the navigation of personalized information, especially in the AR beauty context where consumers' own features (e.g., body ratios, facial features) are highly individually assisted. Thus, the study proposes the following hypothesis:

**H1a: There is a positive relationship between AR interactivity and customers' perceived personalization towards using AR beauty try-on applications.**

According to previous studies, it is indicated that variety seeking can help reduce the degree of uncertainty about future desires by actively obtaining information (Ariely and Levav, 2000). Moreover, a study conducted by Zhang et al. (2022) also found the result implying that "variety seeking will be higher when consumers are making decisions in AI (vs. human) service environment". This finding, as a result, establishes a relatively useful theoretical and empirical connection about the connection between self-variety seeking and interactivity, basing on the previous discussion of how the interactivity in AR beauty context works in comprehending consumers' experience with a solid AI-based background to shape the way consumers would interact in this virtual service environment. Thus, the study proposes the following hypothesis:

**H1b: There is a positive relationship between AR interactivity and customers' self-variety seeking towards using AR beauty try-on applications.**

#### **The influence of AR vividness on customer experience**

McLean and Wilson (2019) demonstrated that vividness, which is the clear, detailed representation of an image in the combination of the actual and virtual world, is one of the most prominent attributes of AR, which can stimulate customers' brand-related responses. Accordingly, it is proposed that vividness plays a crucial aspect of AR when customers want the color shades in virtual makeup to look like the original one since it is the definite purpose of AR, which will ultimately assist customers to contrast and make decisions to acquire the product best suited for their face (McLean and Wilson, 2019). It is therefore suggested that vividness in the shopping environment supported by AR is extensively explored on how it will interact with other Stimulus (S) characteristics in subsequently affecting customers' purchase intention.

In this research context, AR technology combines the sensory experience of actual objects with the non-sensory experience of imaginary objects to create a clear image that is expected to be personalized and tailored to the specific consumer (Smink et al., 2020). For example, the vivid information of visualized products on users' own faces or bodies (e.g., makeup, skincare, hair color products) customizes the experience to that specific consumer. Moreover, perceived personalization elicited by AR vivid information is expected to induce positive consumers' attitudes and evaluations towards the product; thus, ultimately influencing their purchase decision (McLean and Wilson, 2019). As a result, the study proposed the following hypothesis:

**H2a: There is a positive relationship between AR vividness and customers' perceived personalization towards using AR beauty try-on applications.**

According to Kahn (1995), the aesthetic appeal and quality of the product presentation can make consumers more open to exploring and trying out new products, leading to increased variety-seeking. Zhang, et al (2022) supported the same thesis, highlighting the expectation on the AI service environment such as vivid display and the uncertainty it induced will positively influence variety seeking. Ultimately, higher

variety seeking in AR service environments might be motivated by the vividness of product representation to enhance personal control, particularly in the beauty sector, where every individual pursues their own style and looks based on their unique traits. As a result, the study proposed the following hypothesis:

**H2b: There is a positive relationship between AR vividness and customers' self variety-seeking towards using AR beauty try-on applications.**

#### **The influence of AR reality congruence on customer experience**

In the AR context, reality congruence was defined by Kowalczyk et al. (2021) as “the degree to which the realistic virtual presentation fits with the actual product”. In web-based product presentations, 3D dimensions (authenticity, system quality, information quality and entertainment) capture the fit between the virtual and the real products which in turn influence users' perception towards the presented product (Algharabat et al., 2017). Otherwise, if the AR product visualizations are of poor quality or the incorrect size, pixelated, inaccurate, or unrealistic, they do not add value to the users' experience.

AR current applications enable a more direct product experience that provides a combined sensory (by simulating the touch-and-feel of physical products) and give users control over their personalization experience (Hilken et al., 2017; Verhagen et al., 2014). Applied to the AR beauty context, physical and non-physical experiences of simulating beauty products on customers' body parts like cosmetics, hair dye, etc. to personalized and tailored for each individual customer, which consequently are expected to convince positive consumers' attitudes and assessment towards the beauty product; hence, ultimately affect their purchase decision (McLean and Wilson, 2019). Thus, the study proposes the following hypothesis:

**H3a: There is a positive relationship between AR reality congruence and customers' perceived personalization towards using AR beauty try-on applications.**

A research experiment conducted by Poushneh (2018) concurred that 3D product presentations could increase certainty while shopping online since they enable consumers to better evaluate the desired product. Therefore, in the case of being assisted by AR attributes, during the time of trying on AR applications, customers could not only cognitively but also virtually have a try and experience simulating products they are not proprietors of (e.g., a limited collection of lipstick colors from a high-end brand). In accordance with this result, previous studies of Ariely and Levav (2000) brought evidence stating that variety-seeking is referred to as a way of reducing the scope of uncertainty regarding future desires and obtaining information. Accordingly, it is supposed that customers are more likely to increase their self variety-seeking when the virtual presentation and the actual goods match together well since it makes choosing a product easier and reduces the risks involved. Hence, we propose the following hypothesis:

**H3b: There is a positive relationship between AR reality congruence and customers' self variety-seeking towards using AR beauty try-on applications.**

#### **2.2.2. The influences of customer experience on purchase intention**

According to the S-O-R model, customer experiences act as a mediator between technical environmental cues and consumer behavior (Animesh et al., 2011). This study takes two kinds of virtual customer experiences including perceived personalization (Pantano and Timmermans, 2014) and self-variety seeking (Javornik et al., 2021) into account in the research model.

Kim et al. (2013) refers to personalization as linked to tailored information since it appeals to the needs and interests of the customer. Perceived personalization is anticipated to play a crucial role in improving their perceptions in beauty products' online purchase. According to Michael and Thies (2015), personalization leads to a noticeably higher purchasing intention. More precisely, personalized recommendations are seen

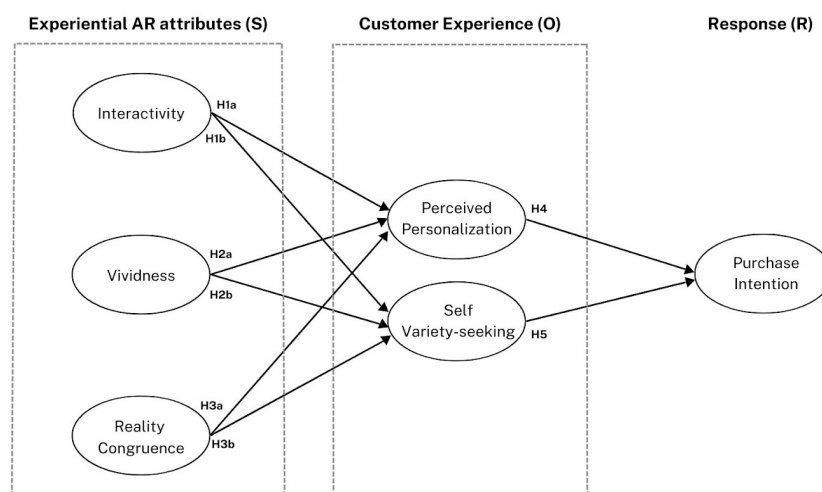
as a one-of-a-kind treat that facilitates their evaluation and decision-making process (Mahapatra, 2017; Zhang et al, 2012). In fact, the AR interface allows users to tailor their experience by selecting various (virtual) beauty products that appear in real-time view of the self or one’s physical world. This results in a more participatory relationship between brands and consumers being formed, consumer demands being satisfied (Ramaswamy and Gouillart, 2008), and enhanced behavioral intention. Thus, the study proposed the following hypothesis:

**H4: Perceived personalization through the experience of AR beauty try-on applications will have a positive effect on purchase intention of beauty products.**

Variety-seeking can be defined as the tendency to diversify choices (Kahn, 1995), which emphasizes that new usage situations or environments can make respondents more open to exploring and trying out new products, and, thus, can lead to increased variety-seeking.

Commonly, in the context of AR beauty applications, users can try hundreds of beauty products (e.g., clothes, makeup, lipstick colors, etc.) and eventually decide according to their choice. (Mendonca et al., 2022). Zhang et al. (2022) also clarified that consumers in the simultaneous-choice condition were more likely to choose a range of goods than those in the sequential-choice condition. Accordingly, the experiment proved that self variety-seeking has a crucial influence on consumer decision-making. These findings play a leading role in demonstrating the wide range customers may test out for several looks to see how cosmetics will seem when worn in real life and finally discover the products that best meet their needs. Therefore, we proposed the following hypothesis:

**H5: Self variety-seeking through the experience of AR beauty try-on applications will have a positive effect on purchase intention of beauty products.**



**Figure 2. Proposed research model**

### 3. RESEARCH METHOD

#### 3.1. Sample and data collection

The data was an analysis of customers in Ho Chi Minh city who have previous experience using AR applications to try on beauty products. This research sample was conducted through interviews and web-based questionnaires. The survey was pre-tested by 25 volunteers with various demographic backgrounds.

After that, the research team developed a web-based survey (Google Form) to collect data from customers. We sent a total of 300 questionnaires, which were used for the last analysis.

Among the respondents, 31 percent were men, and 69 percent were women. Relating to age, results revealed that 88.33 percent of respondents focused on 18 - 25 years old, followed by 26 - 40 years old with 7.67 percent. Considering income, it's almost in the range of low and medium (< 5 mil VND accounts for 59.33 percent and 5 - 10 mil VND accounts for 26 percent). Considering the usage time of AR beauty try-on applications, more than half of respondents (54.67 percent) said that they only used them for less than 10 minutes at a time, followed by 10 - 29 minutes (36.33 percent), and only 4 respondents experienced more than an hour. When asked "the last time they experienced AR beauty try-on", a lot of respondents said that they experienced them recently (<1 recent month accounts for 38 percent, from the last 1-3 months account for 28.67 percent) and only a small percentage (17.33 percent) answered that it was a long time ago, about half a year to 1 year ago. For the last question, only 97 respondents bought beauty products after trying them. The remaining 203 respondents (equivalent to 67.67 percent) said that they do not buy even though they have tried virtual products.

### 3.2. Measurement scale

This research used a 5-point Likert scale questionnaire to measure variables. The measurements for these constructs were adopted from prior studies with some minor modifications to fit the current research context (see Table 1). There are six study conceptions in our research: AR interactivity, AR reality congruence, AR vividness, perceived personalization, self variety seeking, and purchase intention. In general, AR attributes comprise interactivity, reality congruence and vividness, while user experience consists of perceived personalization and self variety-seeking. Interactivity was measured by 4 observed variables, which was adopted and adjusted following the findings of Cyr et al. (2009). The construct of reality congruence consisted of 6 items and was measured based on the study of Kowalczyk et al. (2021). Vividness was assessed based on Babin and Burns (1998)'s single-item construct.

In terms of user experience, the construct of perceived personalization was built with 4 observed variables adopted from the study of Baek and Morimoto (2012); Srinivasan, Anderson, and Ponnavaolu (2002). Four constructs of self variety seeking were adapted from Javornik et al. (2021). Purchase intention was measured based on the scale of Cho et al. (2015).

**Table 1. Measurement scale**

Construct	Measurement	References
Interactivity	<p><b>IN1.</b> When using the AR beauty try-on applications, I was in control of my navigation.</p> <p><b>IN2.</b> When using the AR beauty try-on applications, I had some control over the content that I wanted to see.</p> <p><b>IN3.</b> When using the AR beauty try-on applications, I was in total control over the pace of my visit.</p> <p><b>IN4.</b> The AR beauty try-on applications processed my input very quickly.</p> <p><b>IN5.</b> I was able to obtain the information I wanted without any delay when I used the AR beauty try-on application.</p> <p><b>IN6.</b> This AR beauty try-on application facilitates two-way communication between the visitors and the site.</p>	Cyr et al. (2009)

<b>Vividness</b>	<p><b>VI1.</b> The visual display through the AR beauty try-on applications was clear.</p> <p><b>VI2.</b> The visual display through the AR beauty try-on applications was detailed.</p> <p><b>VI3.</b> The visual display through the AR beauty try-on applications was vivid.</p> <p><b>VI4.</b> The visual display through the AR beauty try-on applications was sharp.</p> <p><b>VI5.</b> The visual display through the AR beauty try-on applications was well-defined.</p>	Babin and Burns (1998)
<b>Reality Congruence</b>	<p><b>RC1.</b> The AR beauty try-on application presents virtual products impressively.</p> <p><b>RC2.</b> Overall, I find that the AR beauty try-on application presents virtual products attractively.</p> <p><b>RC3.</b> The design of the virtual products is visually pleasant.</p> <p><b>RC4.</b> The AR beauty try-on application presents virtual products visually appealingly.</p> <p><b>RC5.</b> The AR beauty try-on application presents the design of the virtual products (e.g., colors, shapes) realistically.</p> <p><b>RC6.</b> The AR beauty try-on application presents virtual products as if they were real.</p>	Kowalczyk et al. (2021)
<b>Perceived Personalization</b>	<p><b>PP1.</b> I was adjusted to my situation when using the AR beauty try-on applications.</p> <p><b>PP2.</b> The AR beauty try-on applications can be used in any way I like.</p> <p><b>PP3.</b> The experience of trying on beauty using AR applications matched my individual needs.</p> <p><b>PP4.</b> The experience of trying on beauty using AR applications was personally relevant to me.</p>	Baek and Morimoto (2012); Srinivasan, Anderson, Ponnaolu (2002)
Self Variety-seeking	<p><b>SV1.</b> I feel that I have learned new things about my looks.</p> <p><b>SV2.</b> I feel that I have increased my knowledge about my appearance.</p> <p><b>SV3.</b> I feel a greater awareness of my appearance.</p> <p><b>SV4.</b> I have added new qualities to my sense of self in terms of my looks.</p> <p><b>SV5.</b> I have expanded my sense of the kind of appearance that I have.</p>	Javornik et al. (2021)
Purchase Intention	<p><b>PI1.</b> I would like to purchase the items I have virtually experienced on AR beauty try-on applications.</p> <p><b>PI2.</b> I am willing to purchase the items via AR beauty try-on applications.</p> <p><b>PI3.</b> I am willing to frequently purchase the items from AR beauty try-on applications in the future.</p> <p><b>PI4.</b> I am probably going to keep purchasing products on AR beauty try-on applications.</p>	Cho et al. (2015)

### 3.3. Analytical method

In this study, SmartPLS 4 was used to measure the proposed research model and hypotheses using partial least squares structural equation modeling (PLS-SEM). The PLS-SEM data analysis, according to Henseler and Chin (2010), completes an investigation in two steps: evaluation of measurement model and evaluation of structural model. Additionally, SPSS 25 was also used to process Harman’s single factor test, as well as compute variables and find frequencies of the demographic variables.

## 4. RESULTS AND DISCUSSION

### 4.1. Results

#### 4.1.1. Common method variance (CMV)

If one component can clarify the bulk (typically more than 50%) of covariance in the dependent and independent variables, common method variance occurs. The research must ensure that there is no common method variance before executing the measurement model. To anticipate whether common method variance exists, we used Harman’s single-factor test.

Results of Harman’s single-factor test (Table 2) reveal 30 factors with eigenvalues greater than 1. Approximately 40% of the variance is accounted for by the first factor. These findings suggest that the study does not suffer from the CMV issue.

**Table 2. Total Variance Explained**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.971	39.904	39.904	11.971	39.904	39.904
2	1.823	6.076	45.979	1.823	6.076	45.979
3	1.443	4.810	50.790	1.443	4.810	50.790
4	1.297	4.325	55.114	1.297	4.325	55.114
5	1.194	3.980	59.094	1.194	3.980	59.094
6	.910	3.035	62.129			
7	.823	2.743	64.872			
8	.759	2.532	67.403			
9	.744	2.479	69.882			
10	.668	2.227	72.110			
11	.653	2.175	74.285			
12	.617	2.055	76.340			
13	.604	2.014	78.354			
14	.583	1.945	80.299			
15	.551	1.836	82.135			
16	.527	1.755	83.890			
17	.473	1.577	85.468			
18	.451	1.502	86.970			
19	.445	1.483	88.453			
20	.404	1.345	89.798			
21	.377	1.258	91.056			
22	.363	1.210	92.266			
23	.344	1.148	93.414			
24	.335	1.116	94.529			
25	.322	1.072	95.601			
26	.306	1.020	96.621			
27	.290	.967	97.588			
28	.270	.899	98.487			
29	.237	.789	99.276			
30	.217	.724	100.000			

Extraction Method: Principal Component Analysis.

**4.1.2. Measurement model assessment**

With reference to the mentioned Table 3, most indicators' loadings were higher than the threshold value of 0.708 (Hair et al., 2018), suggesting that more than 50% of the variance in a single indicator can be explained by the corresponding latent construct, confirming indicator reliability (Benitez et al., 2020; Hair et al., 2017a). The IN3 and IN4 variables had loading factors of 0.661 and 0.681 were retained in the measurement model for their contribution to the construct's conceptualization. Furthermore, the removal of these indicators has no effect on the criteria for construct reliability, as indicated by the extracted internal consistency and variance, as well as its discriminant validity; hence, they are regarded as appropriate for the measurement model (Hair et al., 2013).

We applied composite reliability and Cronbach's Alpha for assessing the reliability of the research. As can be seen from the Table 3, the composite reliability ranged from 0.858 to 0.903, which is consistent with the value suggested by Hair et al. (2009), and the Cronbach's alpha results of all latent variables were above 0.7 (Vinzi et al., 2010), indicating a strong mutual association among indicators in describing the intended constructs.

In terms of convergent validity, the AVE should exceed 0.5 to demonstrate that the constructs capture an adequate amount of variance observed by their corresponding items (Hair et al., 2009). In this study, the AVEs were in the range of 0.503 and 0.677, thus were acceptable.

**Table 3. Reliability and convergent validity**

Construct	Items	Indicator Loadings	Composite Reliability	Cronbach's Alpha	AVE
Interactivity	IN1	0.744	0.858	0.802	0.503
	IN2	0.709			
	IN3	0.661			
	IN4	0.681			
	IN5	0.724			
	IN6	0.731			
Vividness	VI1	0.742	0.897	0.857	0.636
	VI2	0.794			
	VI3	0.797			
	VI4	0.820			
	VI5	0.833			
Reality Congruence	RC1	0.764	0.892	0.855	0.580
	RC2	0.801			
	RC3	0.756			
	RC4	0.763			
	RC5	0.752			
	RC6	0.733			
Perceived Personalization	PP1	0.806	0.880	0.818	0.647
	PP2	0.767			
	PP3	0.828			
	PP4	0.815			
Self variety-seeking	SV1	0.791	0.903	0.865	0.649
	SV2	0.783			
	SV3	0.804			
	SV4	0.823			
	SV5	0.826			
Purchase Intention	PI1	0.797	0.893	0.841	0.677
	PI2	0.849			
	PI3	0.835			
	PI4	0.810			

In the measurement model, the concept of discriminant validity is assessed to assure that a concept measure is empirically distinct and captures phenomena of interest that other measures in a structural equation model do not (Hair et al., 2018). The evidence for the discriminant validity of the constructs is shown in Table 4 through the HTMT value. Most of the values are below the threshold of the  $HTMT_{0.85}$  requirements deemed satisfactory for discriminant validity suggested by Clark and Watson (1995) and Kline (2011). Therefore, it indicates that the measurement model possessed adequate validity and discriminant validity.

**Table 4. Discriminant Validity**

	IN	PI	PP	RC	SV	VI
IN						
PI	0.625					
PP	0.613	0.845				
RC	0.740	0.715	0.676			
SV	0.650	0.721	0.676	0.709		
VI	0.649	0.752	0.739	0.715	0.658	



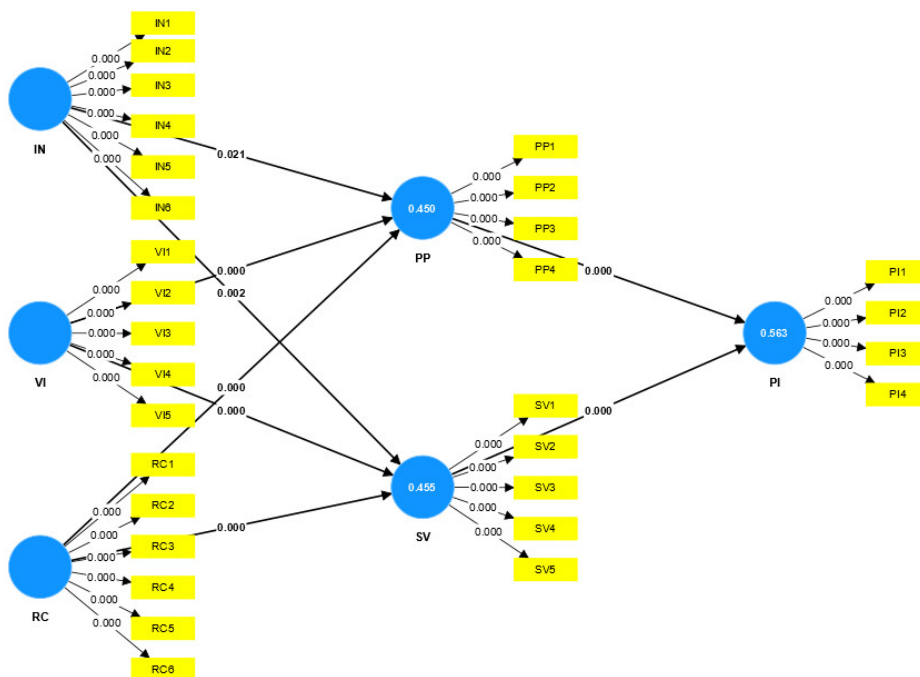
**4.1.3. Structural model assessment**

The results of VIF values (Table 5) are below the common threshold of 5 (Hair et al., 2011), showing that the models do not suffer from multicollinearity.

**Table 5. Variance Inflation Factor**

	IN	PI	PP	RC	SV	VI
IN			1.715		1.715	
PI						
PP		1.479				
RC			1.961		1.961	
SV		1.479				
VI			1.720		1.720	

In this study, PLS-SEM shows all the path coefficient values regarding the variables and factor loadings of each item that it has calculated. Figure 2 shows the values of all items' factors loadings and their path coefficients of PP, SV and PI.



**Figure 3. The structural model after assessing the PLS-SEM**

As suggested by Ramayah et al. (2016), the R2 value measures the goodness of the structural model. The R2 for the generated results of perceived personalization is 0.450, suggesting that 45% of the variance could be explained by the AR attributes and 55% of the variation is explained by other independent variables that are excluded from the model and random error. Moreover, 45.5 percent of the variance of self variety-seeking could be clarified by the AR attributes. As for the R2 coefficient of purchase intention, the value reached 0.563 means that 56.3% of the variation in purchase intention is explained by the mediating variables: perceived personalization and self variety-seeking.

**4.1.3. Hypotheses testing**

The hypothesis testing results are illustrated in Table 6. Bootstrapping outcomes (with 5000 resamplings) for the association between the notions in the suggested study model demonstrated that the t-value of the H1a, H1b, H2a, H2b, H3a, H3b, H4, H5 were higher than 1.96, and these hypotheses were meaningful at a 5% level. As a result, these hypotheses were supported.

**Table 6. Hypothesis testing result**

Hypothesis	Relationship	Standardized beta coefficient	t-value	P-value	Findings
H1a	IN → PP	0.140	2.308	0.021	Supported
H1b	IN → SV	0.204	3.083	0.002	Supported
H2a	VI → PP	0.400	6.245	0.000	Supported
H2b	VI → SV	0.253	3.834	0.000	Supported
H3a	RC → PP	0.235	3.835	0.000	Supported
H3b	RC → SV	0.330	5.244	0.000	Supported
H4	PP → PI	0.521	8.723	0.000	Supported
H5	SV → PI	0.320	5.152	0.000	Supported

## 4.2. Discussions

The study finds that AR attributes positively influence perceived personalization and self variety-seeking, with a stronger effect observed for self variety-seeking ( $\beta = 0.455$ ). This is in line with the findings of Zhang et al. (2022), which suggest that AR attributes enhance the match between virtual presentation and actual goods, simplifying product selection and reducing risks. The findings also confirm the significant impact of AR attributes on perceived personalization ( $\beta = 0.449$ ), supporting the prior theory of Ramaswamy and Gouillart (2008) that highly involved users respond positively to high levels of personalization.

In this study, empirical data-related evidence demonstrates that perceived personalization and self variety-seeking through AR attributes play a significant role in influencing customers' purchase intention. Consistent with the views of Hoyer and Ridgway (1984), variety-seeking orientation was found to be a crucial factor in purchase behaviors. Customers with a higher inclination towards variety-seeking are more likely to have higher purchase intention after experiencing simulated cosmetics through AR. Moreover, similar to Kwon and Kim (2012), perceived personalization is a key factor in purchase intention, as consumer purchases are facilitated through personalization. The more highly accurate, timely, and relevant personalized information is provided, the more enthusiastic in enhancing their intention to purchase an item on its advantages afterwards.

## 4.3. Implication

### 4.3.1. Theoretical implication

Firstly, this study establishes the explanatory value of an established S-O-R model in the context of AR beauty try-on applications. The results show that interactivity, vividness, and reality congruence positively influence customers' experiences. In addition, the study highlights the importance of perceived personalization and self variety-seeking in impacting customers' purchase intentions.

Secondly, this research represents the effort to examine the influence of reality congruence on customers' experiences in using AR beauty try-on applications. This is important considering that previous literature in AR beauty contexts mentioned very less reality congruence as the stimulus in the S-O-R model.

Finally, to examine the relationship between organism and response in the S-O-R model, we introduced another uncommon variable in the AR beauty context: self-variety seeking. In the AR beauty try-on context, relatively few previous studies have focused on self-variety seeking as a part of customers' experiences, as well as its effect on customers' purchase intention for beauty products. Research from Nikhashemi (2021) showed that variety-seeking is a customer response factor, while in our research, we propose it is a part of customers' experiences (Organism).

### 4.3.2. Practical implication

The results firmly support the suggestion of implementing AR beauty try-on applications to increase customer experience through the adaptation of experiential AR features will generate positive responses and influence consumers' intention to purchase beauty products consequently. AR applications appear to be a potentially useful tool in developing successful connections with customers because they are empirically supposed to enhance the sensory richness of the experience, which considerably contributes to the practical implication of this study.

Experiential AR attributes (interactivity, vividness and reality congruence) that relatively lead and enhance positive customer experience. Vividness is found to significantly lead to an increased positive perception of customer experience in shopping, consolidating the background that retailers should make use of images, color, animation, font styles, music, and layout to create a visually appealing AR beauty try-on service experience. Retailers should think about how to convey the try-on platform's architecture and vividness through a strong user interface to interact with customers. In the cosmetics sector, as consumers are usually concerned that the product's color tone and texture do not match the brand's description, it is crucial to optimize virtual products to be as realistic as possible by enhancing the reality congruence features. Therefore, as retailers continually improve the caliber and dependability of their AR tools, ensuring that virtual objects are precisely aligned with the actual environment, even in low-light situations, since a realistic virtual product display can only be realized with good system quality, which in turn boosts the utility of AR (Kowalczyk et al., 2021). Ultimately, the results specifically revealed that since interactivity might result in consumers' excessive usage when performing an ordinary task, "individuals tend to be distracted by irrelevant activities (e.g., playing around the interactivity tools) or be indulged in cognitive laziness", which leads to inferior experiences and attitudes (Tang, F., 2020). Alternatively, customer support regarding AR usage may be incorporated with interactive help features, a search function, or tools for inquiries (Khare et al., 2020). Thus, designers should carefully evaluate the target task with suitable assistance when incorporating interaction features.

### 4.4. Limitation and future development

Beside the contributions of our research, we realized several limitations during the process of implementing. Analytically, the survey could not approach a huge number of possible respondents in other regions to provide an overview of customers' perspectives throughout Vietnam. Besides, the group of authors had difficulties in reaching various demographics leading to the limit in sample objectives and sample size since most of the responses are from 18-24 aged surveyors. Therefore, this study does not generalize the attitude and purchase intention of Vietnamese customers among various age segmentations. As a result, the research responses may differ from each segment, resulting from various experiences and rationales behind the purchase intention of online beauty products. Thus, future studies should extend the sample to include a broader range of research participants, as well as incorporate other theoretical frameworks, to better understand the customers' purchase intention.

## 5. APPENDIX

### Appendix A. Model fit - Coefficient of Determination

	R Square	R Square Adjusted
PI	0.563	0.561
PP	0.450	0.444
SV	0.455	0.450

**APPENDIX B. PATH COEFFICIENTS**

	<b>Original sample (O)</b>	<b>Sample mean (M)</b>	<b>Standard deviation (STDEV)</b>	<b>T statistics ( O/STDEV )</b>	<b>P values</b>
IN → PP	0.140	0.143	0.060	2.308	0.021
IN → SV	0.204	0.204	0.066	3.083	0.002
PP → PI	0.521	0.523	0.060	8.723	0.000
RC → PP	0.235	0.237	0.061	3.835	0.000
RC → SV	0.330	0.333	0.063	5.244	0.000
SV → PI	0.320	0.319	0.062	5.152	0.000
VI → PP	0.400	0.397	0.064	6.245	0.000
VI → SV	0.253	0.252	0.066	3.834	0.000

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# ORGANIC COSMETICS AND ENVIRONMENTAL CONSCIOUSNESS: INVESTIGATING FACTORS INFLUENCING ACTUAL PURCHASE BEHAVIOR OF STUDENTS IN HO CHI MINH CITY

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**ABSTRACT:** Consumers are not only increasingly interested in health but also the environment so they are looking for organic and natural products. In Vietnam in general and Ho Chi Minh City in particular, the practice of organic cosmetics in terms of businesses is still underdeveloped. Therefore, this study explores the consumption behavior of organic cosmetics among students in Ho Chi Minh City - a potential market in Vietnam. The study focuses on three main objectives: Firstly, determining the factors affecting students' behavior of using organic cosmetics. Secondly, testing and measuring the impact of these factors on students' behavior of using organic cosmetics. Thirdly, proposing managerial implications as a reference basis for the management of organic cosmetics supply to increase the number of customers using it through the factors tested from the research model. Based on data collected from 500 students, research results confirm the relationship between Health consciousness, Environmental consciousness, Appearance consciousness, Product knowledge, Price consciousness, Subjective Norm, Attitude towards organic cosmetics, Purchase intention and Actual behavior.

**Keywords:** organic cosmetics, environmental consciousness, actual behavior, Ho Chi Minh City

## 1. INTRODUCTION

Society is increasingly developing in the present day. Industrialization and modernization have been and are gradually improving the quality of human life. When essential needs are met, people begin to pay more attention to personal needs, one of which is the issue of aesthetics and beauty. Looking beautiful and being highly regarded by others is a human desire (Kashyap, 2013). One effective means to fulfill this beauty need is through cosmetics. While in the past, makeup cosmetics were often favored by women, nowadays they are becoming more concerned about skincare and the beauty of their skin (Ulfat & colleagues, 2014). Organic cosmetics are becoming increasingly popular and widely used. According to Mintel, Vietnam is evaluated as a large cosmetics consumption market in the Southeast Asia region. The evidence is that the market scale has grown from \$500 million in 2011 to \$1.78 billion per year in 2016, and reached \$2.35 billion in 2018. According to the latest report, in the first half of 2020, the number of cosmetics users increased by 30%. Similarly, research by Statista indicates that the rate of increase in the number of cosmetics stores nationwide has risen by 40%, from 87% in 2021 to 124% in 2022. The market share is also gradually changing as the trend of using high-quality Vietnamese products is spreading. According to market research estimates, the middle class in Vietnam will be the ones to pay for the rapidly increasing consumption of cosmetic products, reaching up to 33 million people. This estimate is based on the results of the high economic growth rate of over 6-7% annually and a young generation that accounts for 60% of the population.

Organic cosmetics in Vietnam are gradually asserting their position in the market, following the global beauty trend. Reports from Euromonitor International also show that the demand for natural and organic cosmetics among Vietnamese consumers is growing stronger. Thanks to their natural production and ingredients such as cucumber, aloe vera, honey, fruit extracts, plant butter extracts, and milk, which

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are free from the impact of chemicals, antibiotics, growth hormones, etc., organic cosmetics meet strict organic standards and provide natural nutrients that are beneficial for the health of users. These products contain at least 70% of ingredients sourced from certified organic agriculture. The emergence of organic cosmetics has brought about a revolution in the beauty industry. According to a report by the NPD Group, global organic cosmetics revenue reached \$480 million in 2017, representing a 10% increase compared to 2016, and it is predicted to double in 2018. The global consumer attitude towards organic cosmetics has also become more positive, with an additional 5% of consumers seeking organic cosmetics made from natural ingredients in 2017. Over 80% of people believe that natural ingredients will be even more popular in the next 10 years. Furthermore, natural and organic cosmetics companies currently hold the largest market share in the global cosmetics market. In Vietnam, and particularly in Ho Chi Minh City, the practical aspects of organic cosmetics are still underdeveloped from a business perspective. Although the use of skincare products is currently a trend, Vietnamese consumers still prefer using foreign skincare products. Despite there are some studies and articles on skincare products in Vietnam, there is very little research on the consumption behavior of organic cosmetics. The demand for different types of cosmetics will vary in each region of the country. Vietnamese skincare companies, especially those offering organic products, need to implement appropriate measures to establish a solid position in the domestic market. Similar to other countries, Vietnam also experiences a discrepancy between intention and actual behavior.

Therefore, recognizing the increasing trend of interest in natural and organic products from the Vietnamese market and consumers, the author team conducted this study to investigate the usage behavior of consumers influenced by which factors and evaluate the level of influence of these factors on the usage behavior of organic cosmetics among students. This research serves as a basis for beauty companies to develop suitable products and effective business strategies that meet the market demand for natural, organic, less harmful products.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Overview of organic cosmetics**

Although the term “green” has a strong impact in the cosmetics market, there is no exact definition for it. The easiest meaning of this phrase is the connection to “environmentally friendly” and the use of natural/organic ingredients (Leja & Ross-Fichter, 2014). Natural cosmetic products really only include natural ingredients, with at least 95% of the ingredients used being produced according to the principles of natural agriculture. They also do not contain preservatives, synthetic fragrances or petroleum-derived ingredients, among other non-natural origin ingredients (Kapsnet, 2007; Ethos, 2012). Natural products are often characterized by their green features, as consumers are concerned not only about the end product they will use but also about the entire production process, such as recycling packaging and continuous use of natural resources. In addition, the raw material sourcing process is also being considered, using technologies that are deemed less harmful to the environment (FONSECA-SANTOS et al., 2015, IBD, 2019). According to IFOAM (International Federation of Organic Agriculture Movements), certified natural ingredients are natural substances and substances extracted from nature that are grown under natural conditions and certified by a reputable certification organization (IFOAM, 2018; NATRUE, 2019).

Organic cosmetics provide health benefits such as reducing skin disorders, reducing acne, brightening the skin, and keeping the skin soft. It also helps protect the environment by producing and using cosmetics that do not have negative impacts on the environment. According to the United States Department of Agriculture (USDA), if a cosmetic product contains or is made from agricultural ingredients that can meet the USDA/National Organic Program (NOP) production, processing, and labeling standards, the product



can be certified organic under the NOP regulations. Additionally, the production and processing of organic agricultural ingredients and the manufacturing facility of the final product must be certified by a USDA-accredited organic certifying agent. Due to the large amount of natural ingredients that can be safely used in the final cosmetic products, this field of research is promising (CAVINATO, M. et al., 2017).

## **2.2. Theoretical foundation**

This study examines the formation of purchase intentions for organic cosmetics through the Theory of Planned Behavior (TPB) based on individuals' environmental concerns and the availability of organic cosmetics. TPB addresses situations that activate the cognitive attributes of a person leading to the development of intention and subsequent behavior (Ajzen, 2002). In the initial stage, three discriminant factors, specifically attitude toward the behavior, subjective norm, and perceived behavioral control, form the intention toward behavior (Wu, S. I., & Chen, J. Y. (2014)). TPB, as a social-cognitive framework, has been widely applied to explore large domains of behavioral and social research (Cheung, R., Lau, M. M., & Lam, A. Y., 2015 and Yadav, R., & Pathak, G. S., 2017). Recently, TPB has been applied in the field of green consumer behavior research and has produced significant results. TPB has been exploited not only to explore consumer behavior but also to guide the development of government interventions to facilitate the widespread adoption of green products (Afroz, R., Masud, M. M., Akhtar, R., Islam, M. A., & Duasa, J. B., 2015).

TPB has been used to explore green consumption in low-income households. Attitude and perceived behavioral control are the most important predictors of green consumption (Ghazali, E., Soon, P. C., Mutum, D. S., & Nguyen, B., 2017). Subjective norms appear to be low for low-income households, indicating a pressing need to increase societal acceptance of green products. Therefore, it is reasonable to apply this theory in the study of organic cosmetics consumption behavior.

## **2.3. Research concepts and hypothesis**

### **2.3.1. Health consciousness**

The Oxford Dictionary uses the term "health consciousness" to describe the attitude of a person who is aware of the healthiness of their diet and lifestyle. Health consciousness is defined as "the willingness to engage in health-related actions" (Schifferstein & Ophuis, 1998, p. 122). Health-conscious consumers are those who prioritize their health and engage in activities that enable them to live a healthy lifestyle (Newsom et al., 2005; Kim & Seock, 2009; Kim & Chung, 2011). Kim and Seock (2009) also noted that health-conscious consumers may modify their consumption behavior because they believe it will impact their health. Kim and Chung (2011) also showed that health awareness is the most important factor influencing attitudes towards organic personal care products. Consumers who are more concerned about the safety of the food they consume often view organic food in a positive light and prefer it over other types of food (Roddy et al., 1996). Consumers feel that organic food is right for them because it does not contain harmful organic compounds (Devcich et al., 2007). In addition to health awareness being a progressive topic to focus on for consumers, the convenience and readiness of the product also significantly affect the consumption of organic products (Kouya et al., 2016). Therefore, the authors propose the hypothesis:

*H1: Health consciousness has a positive impact on consumer attitudes towards organic cosmetics.*

### **2.3.2. Environmental consciousness**

Some articles have concluded that customers' environmental knowledge and attitudes play a very important role in purchasing green products, as environmental knowledge activates customers' interest in organic products (Schlegelmilch et al., 1996). Yadav and Pathak also pointed out that individuals'

environmental concerns and attitudes towards green products are identified as key determining factors for the intention to purchase green products among young people in India (Yadav and Pathak, 2016). Customers use their knowledge, overview, and commitment to green products to determine their overall awareness of the environmental benefits, economic benefits, reliability, and value of green products to decide to purchase the product (Maniatis, 2016). The higher customers' environmental awareness, the greater their intention to use green products (Arruda et al., 2017). Environmental attitude, product attitude, social impact, and monetary value are estimated to have a positive impact on the intention to purchase green products (Chen et al., 2018).

Facing environmental destruction issues caused by the harm of toxic substances and animal testing in ingredients and products, the cosmetics industry has developed organic products that are produced without the use of pesticides, synthetic chemicals, and animal testing (Prothero and McDonagh, 1992). Along with the findings that consumer environmental awareness is seen as a prerequisite for green consumption (Dembkowski, 1998; Polonsky and Mintu-Wimsatt, 1995). Therefore, the authors propose the hypothesis:

*H2: Environmental awareness has a positive impact on consumers' attitudes towards organic cosmetics.*

### **2.3.3. Appearance consciousness**

The consciousness of appearance, according to Scandell (2001), is an individual's awareness of themselves within their community, and it relates to a person's concern about what others think of their appearance. Those who are concerned about their appearance will have concerns about expressing or altering their appearance (Lee & Lee, 1997 cited in Park & Kim, 2010). The increasing awareness of health, environment, and appearance has created a demand for green cosmetics and beauty care products among consumers (Newsom et al., 2005; Peattie, 2001; Schlegelmilch et al., 1996; Paladino, 2006; Todd, 2004).

Consumers want products that make their skin look better so they can feel confident about themselves. Therefore, companies have found ways to meet the needs of customers without using harmful chemicals on the skin in the long run by using organic products that make people feel good about their appearance. (Todd, 2004). Some people desire to maintain their youthful appearance and improve their appearance, so they seek out chemical-free personal care products with minimal amounts of chemical substances, and can provide less harmful alternatives compared to conventional products (Tirone, 2007). Since organic skin or hair care products are produced with minimal chemical content, they can provide less harmful products than conventional products. Therefore, the authors propose the hypothesis:

*H3: The perception of appearance has a positive impact on consumers' attitude towards organic cosmetics.*

### **2.3.4. Product knowledge**

The knowledge about a product is defined as the way consumers perceive specific products (Beatty & Smith, 1987). The knowledge that consumers receive about products and services is important in their acceptance decisions of the products (Chyh et al., 2017; Ghazali et al., 2017; Suki, 2016; Assaker, Vinzi, & O'Connor, 2011; Tse & Crotts, 2005; Moorman et al., 2004). According to Park et al. (1992), consumer product knowledge is classified into three types: imaginal knowledge- an individual's self-perceived level of knowledge about a product or service; objective knowledge- information about the product stored in the consumer's memory; and experience-based knowledge- information derived from prior product usage experiences. In this study, product knowledge is understood as consumers' imaginal knowledge about organic cosmetic products.

Several studies support the view that product knowledge has a positive impact on consumers' attitudes towards these products, thereby enhancing organic food consumption (Padel & Foster, 2005; Vermeir &

Verbeke, 2008). Lin (2009) found that individuals with prior experience using organic products demonstrated a higher level of environmental knowledge compared to those who have not used such products. Gracia and de Magistris (2008) found that organic knowledge could influence attitudes not only to increase the likelihood of purchasing organic products, but also to increase the usage level of existing consumers. Therefore, the authors propose the hypothesis:

*H4: Product knowledge has a positive impact on consumers' attitudes towards organic cosmetics.*

### **2.3.5. Price consciousness**

Price is the total amount of money a consumer has to pay to purchase a product or service, and it is also a quality attribute. Typically, consumers consider a reasonable price range for the products they want to buy (Bojanic, 1996). Among many consumers, most look for products with maximum benefits but low prices because the high price of the product is considered too expensive (Marian et al., 2014; Hur et al., 2012). Even though buying green products incurs a higher cost, consumers are still willing to pay a higher price because of the value of the product (Tsay, 2009). Some customers show that they accept the high value of organic products (Davis et al., 1995). Consumers feel satisfied when they have to pay a higher price because they know that green products are worth the money. Older and higher-income consumers tend to buy products with higher prices than younger people (Mohd Suki, 2015; Tsay, 2009). Consumers also use the price to make it easier to choose, find alternative products, and make decisions to buy or not (De Medeiros et al., 2016; Pan et al., 2013). Therefore, the authors propose the hypothesis:

*H5: Price awareness has a positive impact on consumers' attitude towards organic cosmetics.*

### **2.3.6. Attitude towards organic cosmetics**

Azjen (1991, p.188) defined attitude towards a behavior as the extent to which a person has a favorable or unfavorable evaluation or appraisal of that behavior. Attitude is also defined as an individual's affective response to a specific behavior (Ajzen, 2002). Both the Theory of Reasoned Action (TRA) (Ajzen & Fishbein, 1975) and the Theory of Planned Behavior (TPB) (Ajzen, 1985) propose that an individual's action is the result of intention, and intention stems from reasoned thinking. An individual's attitude towards the behavior is a decisive factor in their intention, and in reference materials, attitude is considered the best predictor of intention, and in turn, the best predictor of behavior (Cesareo & Pastore, 2014; Cronan & Al-Rafee, 2008; Fishbein & Ajzen, 1975).

According to Ajzen and Fishbein (1980), when an individual's attitude towards a particular behavior is positive, they may be more likely to engage in that behavior. There is a positive relationship between consumer attitude and intention to purchase environmentally friendly products across cultures and for various product types (Kim & Chung, 2011). The decision to purchase green products is one of the positive indicators on the scale of environmental protection behavior (Liobiki, Grincevi & Bernatonien, 2017). An individual who is environmentally conscious and has positive experience with eco-products is more likely to have the intention to purchase green products due to their green characteristics (Norazah, 2016). Therefore, the authors propose the hypothesis:

*H6: Attitude towards organic cosmetics has a positive impact on the intention to purchase organic cosmetics.*

### **2.3.7. Subjective norms**

Subjective norms are related to the perceived social pressure of an individual to engage in a certain behavior (Ajzen, Icek, 1991). According to Teng and Wang (2015), consumers tend to have a positive intention to purchase a product if they perceive that important others have a positive attitude and opinion

about that product. This individual has normative beliefs about the expectations of others (Boon, Lim Kah, Yeo Sook Fern, and Lee Hue Chee, 2020). Social approval from family, friends, and close colleagues influences a person's decision-making (Mancha, Ruben M., and Carol Y. Yoder, 2015). An individual's perception changes significantly with a suggestion or advice from an important person to them (Yadav, Rambalak, and Govind S. Pathak, 2017).

Subjective norms have a significant impact on the formation of intention to purchase green products (Wu, Shwu-Ing, and Jia-Yi Chen, 2014). Social encouragement is essential in the consumption of green products and services (Barua, Promotosh, and Md Islam, 2011). Tarkiainen and Sundqvist (2005) also emphasize the importance of subjective norms in predicting repeat purchase intention. Additionally, Griskeicius et al. (2010) highlight that social status is considered the most critical factor influencing the purchase of environmentally friendly products compared to environmental and financial considerations. Previous studies have also identified a significant positive relationship between subjective norms and intention to purchase organic food (Al-Swidi et al., 2014; Chen, 2007; Smith and Paladino, 2010), organic cotton clothing (Han and Chung, 2014), and organic skincare/hair care products (Kim and Chung, 2011). Therefore, the authors propose the hypothesis:

*H7: Subjective norm has a positive impact on intention to purchase organic cosmetics.*

#### **2.3.8. Perceived behavioral control**

Perceived behavioral control refers to an individual's perception of the difficulties that may arise when performing a specific behavior, including available resources and opportunities (Ajzen, 1991). While resources and opportunities to perform certain behaviors objectively exist, a person's decision is more influenced by their perceived control over the behavior (Ajzen, 1989). Therefore, when a consumer feels a lack of ability, resources, or opportunity to perform an action, they are unlikely to have a strong intention to do so, regardless of objective conditions (Ajzen, 1989; Schifter and Ajzen, 1985). Perceived behavioral control can be understood from two aspects: the individual's internal efficacy and perceived barriers (Sparks et al., 1997, cited in Yanfeng Zhou, et al., 2013).

Previous studies have revealed that internal locus of control is positively related to the purchase of environmentally friendly products and promotes environmentally friendly purchasing behavior (Wang 2014). According to Ajzen (2005), individuals who perceive a higher degree of personal control tend to have stronger behavioral intentions to engage in a specific behavior. When individuals have more resources such as time, money, and skills, and a higher perception of their control, this increases their behavioral intention (Kim & Chung 2011). Therefore, the authors propose the following hypotheses:

*H8: Control on availability of organic cosmetics has a positive impact on intention to purchase organic cosmetics.*

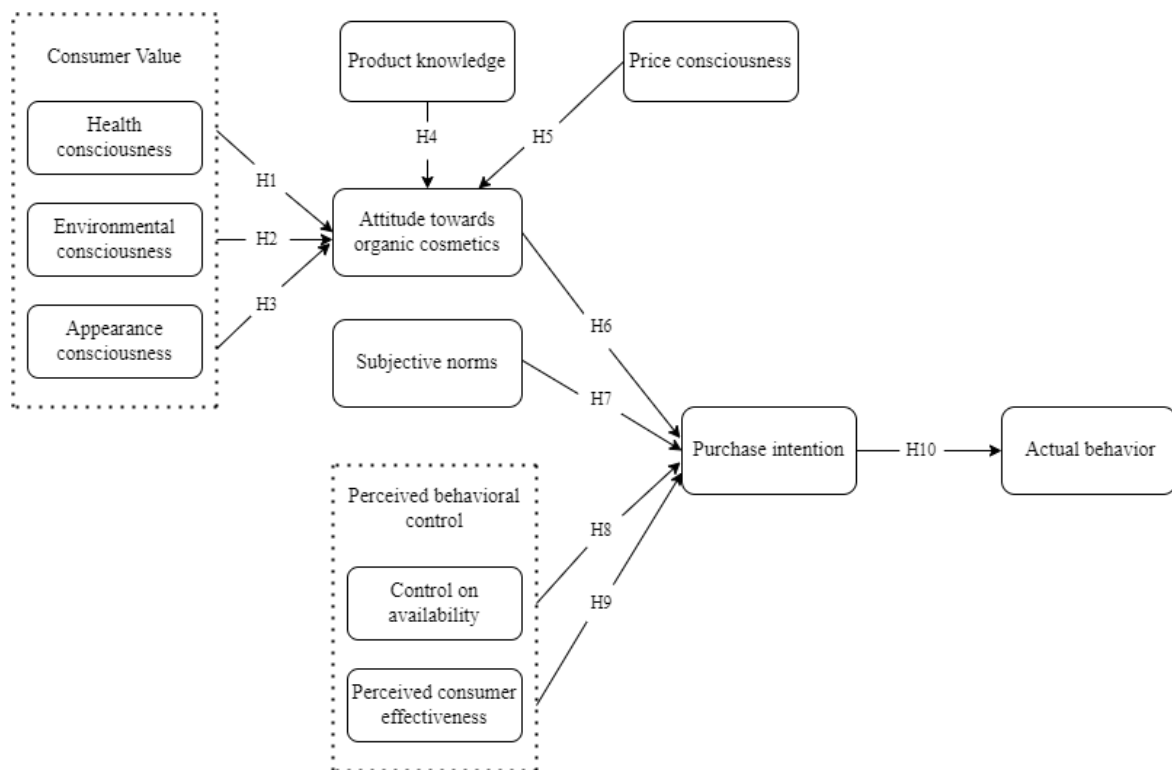
*H9: Perceived consumer has a positive impact on intention to purchase organic cosmetics.*

#### **2.3.9. Purchase intention**

The intention to purchase is defined as an individual's positive attitude and urge to purchase a specific product in a particular situation (Parengkuan, 2017). Customer purchase decision is a complex process that includes the behavior, perception, and attitude of an individual. As stated by Jaafar, Lalp, and Naba (2012, p. 75), purchase intention is an effective tool to predict the purchasing process. Purchase intention can be influenced by perceived quality and value, as well as price. Additionally, people may be influenced by internal or external factors during the purchasing process. Yang, Y. C. (2017) found a strong relationship between purchase intention and the purchase of green skincare products and agreed that consumer purchase

intention significantly affects the purchase of environmentally friendly skincare products. Therefore, the authors propose the hypothesis:

*H10: Intention to purchase organic cosmetics has a positive impact on the actual purchase behavior of organic cosmetics*



**Figure 1. Research model**

### 3. RESEARCH METHOD

#### 3.1. Qualitative research method

The research team carried out a qualitative research method through online discussions with 10 participants in Ho Chi Minh City. Interviews were conducted using the Google Meet application. The interview content was prepared in advance, consisting of open-ended questions about the use of organic cosmetics. Statements were translated into Vietnamese and adjusted for clarity and relevance to the interviewees' cognitive context. Through survey results, discussions, and observations synthesized from theoretical bases, the research team was able to adjust the terms used in the scale and add observation variables to make them suitable for measuring the research definition.

#### 3.2. Quantitative research method

The survey questionnaire used by the research team to collect data was formed based on theory. The content of the observation variables was adjusted to fit the reality of cosmetics users in Ho Chi Minh City. The main content of the survey questionnaire included 44 quantitative questions and 4 customer information questions. The questions focused on exploring the opinions and evaluations of cosmetic users in Ho Chi Minh City. The Likert 5-point scale was used for 44 quantitative questions, with 1 being "strongly disagree", 2 being "disagree", 3 being "neutral", 4 being "agree" and 5 being "strongly agree". The authors used IBM SPSS 20 software to process data. The data, after encoding and selection, will be analyzed through the following: Evaluate the reliability of the scale Cronbach's Alpha, Exploratory factor analysis

(EFA), Discriminant Validity - Heterotrait-Monotrait Ratio (HTMT) and Multivariable regression results.

#### 4. RESULTS AND DISCUSSION

##### 4.1. Results

##### 4.1.1. Descriptive statistical analysis

After completing the sample collection, the researcher removed the survey samples that were not valid as random responses. The number of remaining survey samples is 500 samples.

**Table 1. Statistical table describing survey sample data**

Measure	Item	N	Percent(%)
Gender	Male	46	9.1
	Female	454	90.9
Income	Under 5 million	432	86.4
	5 - 8 million	46	9.1
	Over 9 million	22	4.5

*Source: Author's synthesis*

##### 4.1.2. Cronbach's Alpha reliability test results

Prior to doing the factor analysis, it is necessary to undertake tests to determine the eligibility of the data for the method of factor analysis (Cronbach's Alpha). To be an acceptable measurement model, the total Cronbach's Alpha coefficient should be  $> 0.7$  (Cronbach and Shavelson, 2004) and the inter-item correlation coefficient should be  $> 0.3$  (Clark and Watson, 1995). The results in table 2 show that Cronbach's Alpha and the overall reliability of the factors are all greater than 0.8. Therefore, the overall reliability and factor coefficients of the component measurement scales meet the reliability requirements.

**Table 2. Cronbach's Alpha reliability test results**

Variable	Number of items	Cronbach alpha's value
Health consciousness (HCS)	5	0.899
Environmental consciousness (ECS)	5	0.845
Appearance consciousness(ACS)	5	0.898
Product knowledge (PKE)	4	0.862
Price consciousness (PCS)	5	0.885
Attitude towards organic cosmetics (ATO)	4	0.886
Subjective norms(SNS)	3	0.843
Control on availability(COA)	4	0.812
Perceived consumer effectiveness(PCE)	4	0.858
Purchase intention(PIN)	5	0.859
Actual behavior (ABR)	5	0.884

*Source: Author's calculation*

##### 4.1.3. EFA exploratory factor analysis results

The EFA analysis aimed to evaluate the convergence of observed variables in explaining a factor and the differentiation of groups of observed variables explaining different factors. The KMO coefficient

obtained was  $0.825 > 0.5$ , indicating that the factor analysis was appropriate for the research data; the Bartlett test result was 12520.877 with a significance level of  $\text{sig.} = 0.000 < 0.05$ , demonstrating that the data used for factor analysis was also completely appropriate. At the same time, the Eigenvalue coefficient satisfied greater than 1 for all 11 factors, and the total variance extracted by 11 factors was  $68.526\% > 50\%$ , indicating that these 11 factors explained 68.526% of the variation in the data. The analysis results showed that the observed variables converged and differentiated correctly with the research team's initial proposal.

**Table 3. KMO and Bartlett's Test**

<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</b>		0.825
	Approx. Chi-Square	12520.877
Bartlett's Test of Sphericity	df	651
	Sig.	0.000

Source: Author's calculation

**Table 4. Total Variance Explained**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	18.22	41.637	41.637	18.22	41.637	41.637
2	16.334	39.347	42.755	16.334	39.347	42.755
3	12.859	37.588	45.343	12.859	37.588	45.343
4	8.219	37.220	52.563	8.219	37.220	52.563
5	6.847	35.940	57.403	6.847	35.940	57.403
6	4.592	34.997	62.300	4.592	34.997	62.300
7	2.067	34.652	68.526	2.067	34.652	68.526
8	1.906	34.355	69.607	1.906		
9	1.535	33.091	70.698	1.535		
10	1.112	32.899	70.896	1.112		
11	1.079	32.568	71.165	1.079		
12	0.935	30.350	72.515	0.935		
13	0.922	29.305	72.820	0.922		
14	0.879	29.144	72.963	0.879		
15	0.818	27.918	73.881	0.818		
16	0.799	26.847	73.728	0.799		
17	0.784	24.717	74.445	0.784		
18	0.738	20.601	74.201	0.738		
19	0.731	18.586	75.209	0.731		
20	.718	16.537	75.550	.718		
21	.682	15.331	76.851	.682		
22	0.672	13.187	77.623	0.672		
23	0.625	12.991	78.269	0.625		
24	0.579	11.927	79.957	0.579		

25	0.567	11.772	80.529	0.567
26	0.534	11.646	81.749	0.534
27	0.480	10.513	81.914	0.480
28	0.477	10.413	82.256	0.477
29	0.456	10.236	82.578	0.456
30	0.436	10.023	83.021	0.436
31	0.425	9.786	83.524	0.425
32	0.396	9.652	84.285	0.396
33	0.385	8.562	84.698	0.385
34	0.377	7.635	86.225	0.377
35	0.268	5.267	87.758	0.268
36	0.254	4.513	89.526	0.254
37	0.241	3.221	90.415	0.241
38	0.226	2.314	91.778	0.226
39	0.212	2.206	92.365	0.212
40	0.176	1.785	95.799	0.176
41	0.153	1.563	96.856	0.153
42	0.134	1.228	98.749	0.134
43	0.125	0.513	99.692	0.125
44	0.106	.333	100	0.106

Source: Author's calculation

**Table 5. Pattern Matrix from analysis EFA**

	Component										
	1	2	3	4	5	6	7	8	9	10	11
<b>HCS2</b>	.823										
<b>HCS4</b>	.851										
<b>HCS5</b>	.896										
<b>HCS1</b>	.816										
<b>HCS3</b>	.857										
ECS4		.856									
ECS1		.873									
ECS3		.846									
ECS5		.810									
ACS2			.864								
ACS1			.878								
ACS3			.843								
ACS5			.852								
PKE3				.912							
PKE2				.873							



PKE1	.846		
PKE4	.845		
PCS2	.774		
PCS3	.886		
PCS4	.856		
PCS5	.932		
AT01	.852		
AT02	.866		
AT03	.754		
AT04	.812		
SNS1	.902		
SNS2	.896		
SNS3	.867		
COA1	.758		
COA2	.789		
COA3	.752		
PCE1	.812		
PCE2	.832		
PCE3	.864		
PCE4	.826		
PIN1	.903		
PIN2	.914		
PIN3	.899		
PIN4	.876		
PIN5	.852		
ABR1			.753
<b>ABR2</b>			.824
<b>ABR3</b>			.846
<b>ABR4</b>			.779

*Source: Author's calculation*

In table 5, most of the factor loading factors are greater than 0.5 except ECS2, ACS4, PCS1, COA4 whose factor loading is less than 0.5 so it is rejected. In addition, there is no case that any variable can upload both factors at the same time with the load coefficients close to each other, so the factors ensure convergent and discriminant values when analyzing EFA. Thus, we draw the conclusion to reduce the factor ECS2, ACS4, PCS1, COA4.

#### **4.1.4. Discriminant Validity - Heterotrait-Monotrait Ratio (HTMT)**

The HTMT (Heterotrait-Monotrait Ratio) coefficient is a measure used in Structural Equation Modeling (SEM) to assess the discriminant and convergent validity among variables in a model. The results from table 6 indicate that all indices have values less than 0.85. This shows that the observed variable sets used to measure the concepts in the model are weakly correlated with each other. Therefore, the variables

in the model achieve discrimination. Among them, ECS (Environmental consciousness) and ATO (Attitude towards organic cosmetics) have the best discrimination with an HTMT value of only 0.324. Conversely, the variables PIN (Purchase intention) and HCS (Health consciousness) have the strongest correlation with an HTMT index reaching 0.845.

**Table 6. Discriminant Validity - Heterotrait-Monotrait Ratio (HTMT)**

	HCS	ECS	ACS	PKE	PCS	ATO	SNS	COA	PCE	PIN	ABR
HCS											
ECS	0,534										
ACS	0,642	0,531									
PKE	0,689	0,589	0,635								
PCS	0,621	0,494	0,560	0,720							
ATO	0,686	0,530	0,527	0,420	0,324						
SNS	0,771	0,533	0,629	0,439	0,507	0,732					
COA	0,845	0,545	0,732	0,833	0,810	0,670	0,825				
PCE	0,686	0,640	0,532	0,745	0,828	0,330	0,426	0,831			
PIN	0,842	0,578	0,706	0,672	0,665	0,610	0,658	0,720	0,628		
ABR	0,720	0,552	0,672	0,689	0,533	0,359	0,568	0,650	0,616	0,816	

Source: Author's calculation

**4.1.5. Multivariable regression results – Bootstrap 10000 samples**

All independent and intermediate variables: HCS, ECS, ACS, PKE, PCS, SNS, ATO and PIN (except PCE and COA) have a strong correlation with the dependent variable when the Pearson correlation coefficient is smaller than 0.05. Similar to previous studies, the results of hypothesis testing in this study also use the 5% significance level to evaluate. The results are shown in Table 7:

**Table 7. Multivariable regression results – Bootstrap**

Hypothesis	Relationships	Beta value	Standard deviation (STDEV)	P-value	Inspection results
H1	Health consciousness → Attitude towards organic cosmetics	0,362	0,038	0,000	Accepted
H2	Environmental consciousness → Attitude towards organic cosmetics	0,310	0,036	0,000	Accepted
H3	Appearance consciousness → Attitude towards organic cosmetics	0,151	0,022	0,035	Accepted
H4	Product knowledge → Attitude towards organic cosmetics	0,317	0,036	0,013	Accepted
H5	Price consciousness → Attitude towards organic cosmetics	0,446	0,079	0,000	Accepted
H6	Attitude towards organic cosmetics → Purchase intention	0,414	0,018	0,002	Accepted
H7	Subjective norms → Purchase intention	0,279	0,040	0,000	Accepted
H8	Control on availability → Purchase intention	0,265	0,053	0,062	Rejected
H9	Perceived consumer effectiveness → Purchase intention	-0,236	0,019	0,052	Rejected
H10	Purchase intention → Actual behavior	0,390	0,046	0,000	Accepted

Source: Author's calculation and synthesis

The results in table 7 show out of 10 proposed hypotheses. H1, H2, H3, H4 and H5 indicated that Health

consciousness ( $\beta = 0.362$ ,  $p < 0.001$ ); Environmental consciousness ( $\beta = 0.310$ ,  $p < 0.001$ ); Appearance consciousness ( $\beta = 0.151$ ,  $p < 0.05$ ); Product knowledge ( $\beta = 0.217$ ,  $p < 0.05$ ) and Price consciousness ( $\beta = 0.446$ ,  $p < 0.001$ ) were demonstrated to have a positively significant effect on Attitude towards organic cosmetics. Therefore, H1, H2, H3, H5 and H5 were accepted. The results showed that Attitude towards organic cosmetics ( $\beta = 0.414$ ,  $p < 0.05$ ) and Subjective norms ( $\beta = 0.279$ ,  $p < 0.001$ ) positively impact on Purchase intention, therefore H6 and H7 were accepted. The proposed relationship between Attitude towards organic cosmetics. Therefore, H1, H2, H3, H5 and H5 were accepted. The results showed that Attitude towards organic cosmetics, Subjective norms and Purchase intention was tested. Control on availability ( $\beta = 0.265$ ,  $p > 0.05$ ) and Perceived consumer effectiveness ( $\beta = 0.236$ ,  $p > 0.05$ ), so H8 and H9 were rejected. Finally, Purchase intention had a positive impact on Actual behavior ( $\beta = 0.390$ ,  $p < 0.001$ ). Thus, H10 was accepted.

#### 4.2. Discussion

The purpose of the study is to explore the factors affecting the behavior of using organic cosmetics, especially the factors of environmental awareness and consumers' attitudes towards organic cosmetics when the problem of polluting the environment is becoming more and more urgent. Research results show that HCS, ECS, ATO, PCS have the strongest impact on PIN.

The findings demonstrate the research of previous studies by Kim, H. Y., & Chung, J. E. (2011); Al Mamun et al. (2020); Tewar et al. (2021), Shimul et al. (2022) and Chhetri, S., Fernandes, S., & Baby, S. (2021) support the relationship between HCS, ECS and ACS to ATO. As for the relationship of PKE and PCS to ATO, previous studies by Ghazali et al. (2017) and Tengli, A., & Srinivasan, S. H. (2022) showed that they are statistically significant relationships. The results of our study also showed similar results. Next, the relationship between SNS and PIN is accepted with  $\beta = 0.279$ , equivalent to the antecedent studies of Chhetri, S., Fernandes, S., & Baby, S. (2021); Chen, M. F. (2007) and Pop, R. A., Săplăcan, Z., & Alt, M. A. (2020). Finally, the hypothesis of the relationship between COA to PIN in the study supports Nguyen, T. H et al. (2017) but the hypothesis of the relationship between PCE to PIN is not supported. Overall, the researcher's findings provided a thorough explanation of the factors impacting on actual purchase behavior of organic cosmetics. This also supports previous research.

#### 5. CONCLUSION

The research topic on factors influencing the use of organic cosmetics among students in Ho Chi Minh City is a very interesting and highly applicable topic. In today's era, the demand for using organic cosmetics has become a trend that many consumers are interested in. This topic focuses on the factors influencing the use of organic cosmetics among students, including psychological, social, and economic factors. Psychological factors include concerns about health, preference for natural and safe products, confidence when using organic cosmetics, as well as the influence of product information. Social factors include the opinions of friends, family, and relatives about using organic cosmetics, as well as social values related to the use of these products. Economic factors are also an important factor in deciding to use organic cosmetics. The cost, convenience, features of the product, and market selection can also influence the use of organic cosmetics among students. This study also provides many practical contributions to businesses in the cosmetics industry, market managers.

*Firstly*, research results show that attitude towards organic cosmetics emerges as the most important factor in predicting buying behavior of organic cosmetics, followed by intention to purchase organic cosmetics. Individual concern for the environment seems to be the third most important essential factor predicting the

purchase of green skin care products. So administrators or marketers can use the results of this study to better understand consumer attitudes towards organic cosmetic products. The designed advertising strategies can pay more attention to the health and environmental consciousness of consumers towards organic cosmetic products. Two factors should be emphasized for the advertising of organic cosmetic products.

*Secondly*, the study also revealed that product knowledge is the main driver of attitudes towards organic cosmetic use behavior. The public must be made aware of organic cosmetic products through various advertising platforms to improve consumer knowledge. Marketers need to put in place communication efforts to make consumers more aware and increase their knowledge about organic products as well as efforts to reduce pollution and promote eco-friendly behaviors. environment. Marketers should use thumbnails as a marketing tool to create tests. This can be applied when introducing new products or targeting potential consumers. As consumers become more and more aware of the issues of carbon emissions and climate change, there may be more of a shift towards environmentally friendly products.

*Thirdly*, the role of subjective norms and their impact on consumer attitudes and purchase intentions is extremely important. Along with this, individuals' environmental concerns are also important and marketers should aim to create a brand message that impacts individuals and society as a whole.

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## DOES THE METAVERSE EDUCATION APPLICATION PLATFORM HAVE THE POTENTIAL TO TRANSFORM LEARNING FORM IN EDUCATIONAL INSTITUTIONS IN THE FUTURE?

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*Abstract: Rapidly evolving Metaverse technology has provided significant benefits for online education in recent years. Because empirical studies on user adoption of Metaverse technology in Vietnam, particularly in Ho Chi Minh City, are limited, the current study fills a research gap concerning the Metaverse Education Application Platform. The target objects are the younger generation, who are the most ready to use technology and the internet, and for whom technology has become a part of their daily lives. To predict the factors affecting the intention to use Metaverse as an effective learning aid, this study combined the TAM and PPM models together with the TRA and TPB theories. A survey was conducted on 217 students in Ho Chi Minh City in January and February 2023. The research methods used included Cronbach's Alpha test, EFA, Pearson's correlation test and Linear regression analysis. The research results show that there are four factors that positively affect the intention to use the Metaverse Education Application Platform include Social Influence, Situational Teaching, Social Needs and Personalized Learning in descending order of impact. Meanwhile, no correlation was found between the intention to use and the five factors Learning Convenience, Perceived Usefulness, Perceived Ease Of Use, Task - Technology - Fit and Habit. This study is also limited in terms of space and sample size so further studies will overcome this limitation and provide more convincing evidence.*

**Key words:** Metaverse, Metaverse technology, Metaverse Education Application Platform, Online education, Intention to use

### 1. INTRODUCTION

Because of the 4.0 revolution's modern technological achievements and the emergence of the Covid-19 pandemic, online learning via online platforms is becoming increasingly popular. Since its inception, online education has relied primarily on two system types: asynchronous and synchronous e-learning (Stöhr, Demazière & Adawi, 2020). Both rely on software or web applications in two-dimensional digital environments that span in-plane digital windows with width and height but no depth. Therefore, 2D web-based applications have limitations and inefficiencies that have a negative impact on education: low self-perception, no presence, inactivity, and crude emotional expression (Mystakidis, 2022). All of these constraints can be overcome with immersive 3D spatial environments and this 3D virtual reality is called the "Metaverse".

The term Metaverse first appeared in the novel, Snow Crash (Stephenson, 2003). The word "metaverse" refers to the combination of the prefix "meta," which means "beyond," and the suffix "verse," which means "universe". The phrase was described as "a computer generated world beyond the physical world that is a fully immersive 3D digital environment that reflects the totality of shared online space across all dimensions of representation" (Dionisio & Gilbert, 2013). In 2021 and 2022, the Metaverse received a lot of public attention (Bibri & Allam, 2022). It earned recognition, which shifted the attention of businesses, investors, and customers. Other signs include Facebook changing its name to Meta (Kraus et al., 2022) and Microsoft completing the biggest takeover deal in history by buying a virtual reality (VR) startup for USD 68.7 billion (Bakar et al., 2022). The Metaverse is based on technologies that allow for multisensory interactions with virtual environments, digital objects and people like Extended Reality or Cross Reality (XR) (Mystakidis, 2022). Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality are all parts of XR (MR).

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In higher education, the use of virtual worlds has been a recurring theme for several years (Reisoğlu et al., 2017; Wood & Gregory, 2018), allowing the teacher and student to explore new methods for the teaching-learning process, where ICTs and emerging technologies play a key role in this regard, maintaining interactivity and immersion as the primary premise, both of which are critical in this process (Díaz, 2017). In recent years, rapidly developing Metaverse technology has provided significant benefits in online education (Kye et al., 2021; Lin et al., 2022). Edu-Metaverse is the twin of the real educational world that uses metaverse technology in the field of education. Meta, Roblox, Zepeto, and other companies have begun to develop the Metaverse Education Application Platform (Wang & Shin, 2022). They incorporate the Metaverse into the teaching project practice and provide users with a better experience. Thanks to Metaverse, educational institutions will be able to provide a 360-degree experience to students and users, as well as much flexibility and adaptability to unforeseen events (Muijs, 2015). However, the use of metaverse technology in the education industry faces some obstacles. For example, there is a significant deviation between the product software and the needs of user groups in the development of the education application platform (Teräs et al., 2020). Although the Application of the Metaverse in Education makes learning more lively and exciting, specifically, it will be possible to take lesson gamification to a new level, to travel without moving to discover the history and culture of other places, and students will be able to learn the laws of physics and enjoy science in ways they never imagined possible (Contreras, 2021), but very few research papers on the level of readiness to apply it in education. Moreover, this concept of “Metaverse Education” is still not familiar to the masses (Julian, Chung & Wang, 2023). However, Vietnam was predicted to place first among the top ten nations in the globe in terms of E-L revenue growth from 2011 to 2016, with an E-L growth rate of 44.3% (Insight, 2011). The Ministry of Education and Training and the Vietnam Government’s efforts to digitize curriculum in schools, the development of online higher education options will all contribute to the extension of education.

Firstly, we have only found the first and only study on Metaverse in Vietnam by Van et al. (2022) with the topic “A Conceptual Framework for Determining Metaverse Adoption in Vietnam IT Enterprises” published at the International Conference on Big Data, Cloud Computing, and Data Science. Therefore, the present research can be considered as pioneering Metaverse topics in the field of education in Vietnam, particularly the case in Ho Chi Minh City. Secondly, the models used in educational technology research in the past were preminent the Technology Acceptance Model (TAM) model or the TAM model combined with Task-Technology Fit (TTF), Integration of Innovation Diffusion Theory (IDT), Integrating Information System Success Model (ISSM) and Expectation-Confirmation Theory (ECT) (Wang & Shin, 2022). A new combination model proposed in this study, TAM and PPM (Push-Pull-Mooring), has been shown to be highly correlated with research on readiness to use educational technology (Wang & Shin, 2022; Granić, 2022; Nayak et al., 2022). The combination of two models TAM and PPM is also considered a new research in the field of technology and has been simulated in our current study.

User adoption and adaptation to these innovations is critical for efficiency and sustainability (Toraman, 2022). Therefore, exploring the factors of user intent on the application platform will thus aid in resolving the issue of a mismatch between the supply of educational technology and the demand of users, as well as the readiness to use then truly bring users into the Metaverse Education ecosystem. We especially focus on students in Ho Chi Minh City, Vietnam because the younger generation are the ones with the highest levels of internet and technology readiness and seem to be part of their daily lives (Wijaya & Afgani, 2021). An online survey was conducted in January and February 2023 at a few high schools/colleges/universities in Ho Chi Minh City through Google Form. The overall objective is research on factors affecting intention to use the Metaverse Education Application Platform. Specific Objectives are as follows:

(1) Identify factors influencing intention to use the Metaverse Education Application Platform of students in Ho Chi Minh City.

(2) Evaluate the impact of each factor on the intention to use the Metaverse Education Application Platform of students in Ho Chi Minh City.

(3) Discuss and recommend solutions corresponding to the research results achieved.

This study was conducted to pave the way for future research on the adoption and application of outstanding features of the Metaverse Education Application Platform. Besides, the study also provides readers with new perspectives on the virtual reality world like Metaverse and the penetration of this platform into the Vietnam market in general and Vietnam education in particular. The obtained research results are the basis for recommending solutions for educational institutions to consider combining the Metaverse Education Application Platform to achieve quality teaching and learning. The study also suggests a number of businesses apply this platform to improve remote working performance or enhance the real-life experience for their customers. Moreover, for technology companies, this research will be a premise for them to develop this application with useful features suitable for different target groups.

## **2. THEORETICAL FRAMEWORK**

### **2.1. Theoretical Background**

The Push-Pull-Mooring (PPM) model is a valuable framework for understanding behavioral intentions related to technology adoption and migration. The model draws from the classical theory of behavioral explanation for geographical relocation (Jung, Han & Oh, 2017). The push effect refers to the negative factors that motivate people to leave the place of origin (economic opportunities, natural disasters, etc.) (Stimson & Minnery, 1998). Pull factors attract people to move in (excellent quality education, political freedom, etc.). Mooring factors are related to migratory behavior, which can hinder or facilitate decision behavior. The PPM model has been extended to explain switching behavior in various domains, in the context of technology switching behavior, push factors motivate users to move away from their current product or platform, while pull factors attract them to adopt new products (Lewis, 1982). Applying the PPM model to this research, conversion behavior refers to users transitioning from a traditional educational platform to a multidimensional educational application platform. Push factors include Personalized Learning, Situational Teaching, and Learning Convenience, while pull factors encompass Perceived Usefulness, Perceived Ease of Use, Social Needs, and Task-Technology Fit. Additionally, mooring factors (Habit and Social Influence) capture personal and social motivations for switching from traditional educational platforms to the Metaverse Education Application Platform.

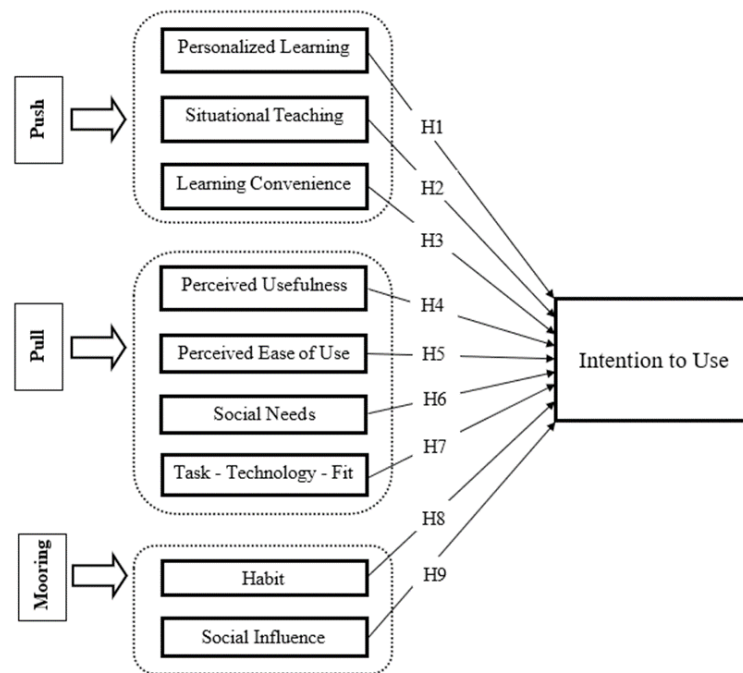
The Technology Acceptance Model (TAM) is based on the theory of rational behavior and was discovered by Davis, Bagozzi & Warshaw (1989). The TAM model consists of two main determinants: perceived usefulness will reflect the extent to which an individual thinks using technology will improve job performance, meanwhile, perceived ease of use will refer to the degree to which a person thinks it is easy to use a technology system (Moon & Kim, 2001). In the field of education, the TAM model has been used to study the factors affecting teachers' acceptance of learning on mobile devices (Mac Callum & Jeffrey, 2014). In addition, Al-Rahmi et al. (2021) built up the factors affecting university students' acceptance of e-learning technology based on the TAM model.

The Theory of Reasoned Action (TRA) is a general theory of behavior that was first introduced in 1967. The TRA theory holds that the conscious performance of a behavior will be influenced by a person's intention and normative beliefs and attitudes towards performing that behavior (Ajzen, 1991). Accordingly, normative



beliefs and motivations to conform will create a subjective norm, or social influence, that does not depend on the individual's point of view. The opinions and behavior of people around will determine the behavior and intention of consumers themselves (Al-Suqri & Al-Kharusi, 2015). On the other hand, the theory of planned behavior (TPB) is an improvement of the theory of reasonable action (TRA), that explains different behaviors and behavioral intentions, which are not under one's intentional control (Ajzen, 2002). In the study, this theory is used to analyze and explain the impact of social influence on usage behavior. Subjective norms are social influences, which will be influenced by normative beliefs - the beliefs of others involved about the performance of a particular behavior; and perceived behavioral control is influenced by controlling beliefs about the presence of factors that can trigger or hinder the performance of consumer behavior.

## 2.2. Research Hypothesis



**Figure 2.1. The theoretical framework for the Intention to Use the Metaverse Education**

### Application Platform

Lee (2022) showed that personal learning is glossed as using a technological tool or related skills to complete a task by an individual to fulfill his or her own learning needs (e.g. searching and reading online materials for writing an essay, looking for information to enhance knowledge). Personalized learning in this study means that users can formulate their own learning plans through the Metaverse Education. Lv, Yang & Zhang (2020) believed that in the era of artificial intelligence, personalized learning is the mainstream of future development, and the platform should provide users with a stronger independent learning environment. Moreover, research by Wang and Shin (2022) also found that personalized learning plays a significant positive role on the intention to use the Metaverse Education Application Platform.

Situational teaching means that under the guidance of the teaching program and teaching materials, teachers create various situations to make students immerse into the abundant, natural or semi-natural customary situation, arousing students' emotional experience, helping the students to understand teaching content rapidly and correctly (Wang & Zhou, 2011). Among the pushing factors, situational teaching has a more significant impact to better reflect the user's use intention of the Metaverse Education Application

Platform (Wang & Shin, 2022). Furthermore, research by Guo and Gao (2022) analyzing empirical data on the three kinds of learning activities shows that Metaverse-powered experiential situational English teaching can promote the improvement of students' sense of interactivity.

Learning convenience is defined as the ability of the students to perform learning activities in unlimited time and space (Jin et al., 2021). In virtual learning platforms, students find convenience of working and learning at their own pace (Raghupathi, 2013). Previous studies proved that convenience has a positive and significant impact on intention to use (Izquierdo-Yusta & Schultz, 2011; Wardana et al., 2022). The results of the study by Lisana (2022) argued that learning convenience is a variable in the push factor of the PPM framework and it had a positive significant direct effect on students' switching intention. Besides, previous studies agreed that learning convenience is one of the important push factors that affect the decision of university students to use learning platforms (Chen & Keng, 2019; Jin et al., 2021).

**H1:** *Personalized Learning has a positive impact on users' intention to use the Metaverse Education Application Platform.*

**H2:** *Situational Teaching has a positive impact on users' intention to use the Metaverse Education Application Platform.*

**H3:** *Learning Convenience has a positive impact on users' intention to use the Metaverse Education Application Platform.*

Davis (1989) defined perceived usefulness as “the degree to which a person believes that using a particular system would enhance his or her job performance”. Perceived usefulness in this study refers to the user's expectation of obtaining benefits from using the Metaverse education application platform. Besides, Davis (1989) also defined perceived ease of use as “the degree to which a person believes that using a particular system would be free of effort”. In this study, perceived ease of use relates to how simple it is for users to learn how to utilize the Metaverse Education Application Platform. Research by Toraman (2022) found a significant positive correlation between perceived usefulness, perceived ease of use and the Metaverse usage intention. Perceived usefulness, perceived ease of use is one of the factors that have a strong impact on users' intention to use Metaverse (Akour et al., 2022). Moreover, many other studies also showed that perceived usefulness, perceived ease of use have a positive impact on intention to use the Metaverse Education Application Platform (Wang & Shin, 2022; Alawadhi et al., 2022; Almarzouqi, Aburayya & Salloum, 2022).

Lu & Yang (2014) defined social needs as “the requirements of connecting, interacting with people, creating and maintaining social connections through social networks”. Besides, social need is the learners' drive to utilize the resources that let them interact with and collaborate with others during the learning process (Mondi, Woods & Rafi, 2008). Xie, Zhao & Ma (2019) verified that in a virtual community, social needs are the core factor affecting the interaction of members of the community. When users perceive a social networking site is fit for their social needs, they will have the intention to use it (Lu & Yang, 2014). Wang and Shin (2022) also showed that social needs have a significant positive effect on the intention to use the Metaverse platform.

Task - Technology - Fit (TTF) is the ability to concretize practical aspects when using technology in life, including users' perception of technology as well as the fit between characteristics and tasks of technology (Afshan & Sharif, 2016). In the past, Rogers has supported the assumption that technology is compatible when it aligns with user preferences (Rogers, 2017). Additionally, TTF is considered an important factor when deciding to apply a particular technology in a learning management system to improve student learning performance (McGill & Klobas, 2009).

*H4: Perceived Usefulness has a positive impact on users' intention to use the Metaverse Education Application Platform.*

*H5: Perceived Ease Of Use has a positive impact on users' intention to use the Metaverse Education Application Platform.*

*H6: Social Needs have a positive impact on users' intention to use the Metaverse Education Application Platform.*

*H7: Task - Technology - Fit has a positive impact on users' intention to use the metaverse education application platform.*

Habit is defined as a human instinct that has the effect of reducing human cognitive load in the decision-making process (Sun et al., 2017). In the past, due to the impact of the pandemic, students had to switch to online learning, some places have applied the Metaverse Education Application Platform in the past. Students are used to online learning, and this habit has an effect on students' motivation to continue using the Metaverse Education Application Platform (Li, 2018). A study on internet service applications also shows that users are not willing to use new services even if they have relative advantages, i.e. previous usage habits have a positive impact on with the intention of using the educational application platform Metaverse (Cheng, Lee & Choi, 2019).

Social Influence is described as the fact that users are influenced by friends, classmates, public opinion, news or other factors when they make decisions to use (Zhou, Lin & Deng, 2021). Lee's research considers social influence as a factor that makes users perceive that others approve and encourage them to participate in using the Metaverse Education Application Platform (Lee, Hsieh & Hsu, 2011).

*H8: Habit has a positive impact on users' intention to use the metaverse education application platform.*

*H9: Social Influence has a positive impact on users' intention to use the metaverse education application platform.*

### **3. RESEARCH METHOD**

#### **3.1. Research sample and data collection**

Primary data source was collected online with Google Form support. The respondents are students of a number of high schools/colleges/universities/ postgraduate or above students in Ho Chi Minh City who are interested in innovative technology applications or recognize the Metaverse Education Application Platform.

The initial target sample size was 200. However, during the survey period from January to February 2023, the research questionnaire reached 217 respondents. After checking and filtering the data, there are 201 valid samples remaining for the analysis.

#### **3.2. Research design**

This study uses the online questionnaire interview method which is referenced from previous research papers. These studies have been conducted in a number of other countries and some of them published in international journals. With reliable sources, the current study has adapted some questions to suit the research background in Vietnam.

The questionnaire is divided into two parts so that the respondents' portraits become more specific and diverse. The first part is the questions about the respondents' basic characteristics (gender, education level and ways to recognize the Metaverse Education Application Platform). The second part is the questions related to the main content of the study aimed at data mining for analysis. The questions revolved around the respondents'

perceptions of the characteristics of the Metaverse Education Application Platform (convenience, usefulness, ease of use,...), habits, social needs and their intention to use this platform in the future.

The factors in the study were measured on a 5-point Likert scale (1-Strongly disagree, 2-Disagree, 3-Normal, 4-Agree, 5-Strongly agree). The questionnaire includes a total of 37 items, the respondents will receive the Vietnamese version of the questionnaire for their convenience. Quantitative methods will help research to measure and determine the factors affecting the intention to use the Metaverse Education Application Platform and the level of influence of each factor. The obtained research results will be an important basis for recommending appropriate solutions.

### **3.3. Data Analyzing**

After collecting survey results, the data was filtered and cleaned for analysis using SPSS software. The research methods used include:

- Filtering, checking and entering data.
- Cronbach's Alpha test to evaluate the reliability of the scale. The value of more or less contribution is reflected through the correlation coefficient of the total Corrected Item - Total Correlation variable. Thereby, allowing to eliminate inappropriate variables in the research model.
- Exploratory Factor Analysis (EFA) to determine the number of factors affecting a set of measurable variables and the strength of the relationship between each factor and each measurement variable.
- Pearson's correlation test to measure the level of impact between independent variables and dependent variables.
- Multiple Linear Regression (MLR) analysis and Mean value to estimate the relationships between dependent and independent variables in the model.

## **4. RESULTS AND DISCUSSION**

### **4.1. Results**

#### **4.1.1. Sample description**

The primary data was collected online using Google Forms, resulting in 201 valid samples for analysis. Among the participants, 39.3% were male, and 60.7% were female. Regarding education level, 7.5% were high school students, 8.5% were college students, 72.6% were university students, and 11.4% were postgraduate or above students. In terms of awareness of the Metaverse Education Application Platform, 43.9% discovered it through social networks, 22.6% through advertisements, and 33.4% through family and friends. The grammar is correct in this version.

#### **4.1.2. Cronbach's Alpha test**

Cronbach's Alpha test is used to assess the reliability of observed variables within a factor. It measures the correlation between these variables. Generally, a good scale should have a Cronbach's Alpha reliability of 0.7 or higher (Nunnally, 1978). However, for preliminary exploratory studies, a threshold of 0.6 is acceptable (Sekaran & Bougie, 2016).

In this study, variables with a Cronbach's alpha value  $\geq 0.6$  are considered satisfactory. The results in **Table 4.1** indicate that all variables have Cronbach's alpha values exceeding 0.6, suggesting a very good scale. Therefore, these nine independent variables and one dependent variable will be used for EFA analysis.

**Table 4.1. Result of Cronbach's Alpha test**

Construct	Item	Number of Items		Cronbach's Alpha	Results
		Before the test	After the test		
Personalized Learning	PL	3	3	0.668	< 0.7 (low internal consistency)
Situational Teaching	ST	5	5	0.798	> 0.7 (high internal consistency)
Learning Convenience	LC	4	4	0.696	< 0.7 (low internal consistency)
Perceived Usefulness	PU	4	4	0.773	> 0.7 (high internal consistency)
Perceived ease of use	PE	3	3	0.629	< 0.7 (low internal consistency)
Social Needs	SN	3	3	0.659	< 0.7 (low internal consistency)
Task - Technology - Fit	TT	3	3	0.627	< 0.7 (low internal consistency)
Habit	HB	4	4	0.784	> 0.7 (high internal consistency)
Social Influence	SI	4	4	0.726	> 0.7 (high internal consistency)
Intention to Use	IU	4	4	0.772	> 0.7 (high internal consistency)

#### 4.1.3. Exploratory Factor Analysis (EFA)

EFA is a quantitative method that reduces a set of interdependent measures into a smaller, more meaningful set of variables while retaining most of the information from the original variables (Hooper, 2012). In this study, the team employed the principal component extraction model with Varimax rotation. They conducted three separate EFA tests on 33 items, grouped into three categories: Push, Pull, and Mooring. Only variables with a factor loading greater than 0.5 were retained.

After removing the variables with bad values from the model, the final analysis results are shown in Table 4.4 as follow: Push group include 3 factors (ST, LC, PL) with 10 items; Pull group include 4 factors (PE, PU, SN, TT, PE) with 13 items; Mooring group include 2 factors (HB, SI) with 8 items and dependent variable include 1 factor (IU) with 4 items.

#### 4.1.4. Multiple Linear Regression Analysis

The magnitude of the independent factors' influence on the dependent variable can be determined using the linear regression equation. The multiple linear regression model is a multivariable regression model with nine independent variables. After the EFA stage, the model was constructed using these nine constructs, and it was constructed as follows:

$$IU = \beta_0 + \beta_1 PL + \beta_2 ST + \beta_3 LC + \beta_4 PU + \beta_5 PE + \beta_6 SN + \beta_7 TT + \beta_8 HB + \beta_9 SI$$

The results of the regression analysis presented in Table 4.2 show that the independent variables in the regression account for 57.4% of the changes in the dependent variable. Additionally, the Durbin-Watson value obtained is 1.854, indicating the absence of multicollinearity among these variables.

**Table 4.2. Model summary of multiple linear regression analysis**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.758 <sup>a</sup>	0.574	0.554	0.66782243	1.854

Six out of the nine independent variables (Situational Teaching, Learning Convenience, Personalized Learning, Task-Technology Fit, Habit, and Social Influence) positively impact the dependent variable, Intention to Use (IU) (Table 4.3). These findings confirm six hypotheses from the research framework, which are presented in Table 4.4 and will be discussed further.

The standardized linear regression equation is as follows:

$$IU = 1.132E-16 + 0.315 HB + 0.227 ST + 0.216 SI + 0.160 LC$$

**Table 4.3. Model summary of regression coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1.132E-16	0.047		0.000	1.000
	ST	0.227	0.057	0.227	3.985	0.000
	LC	0.160	0.057	0.160	2.824	0.005
	PL	0.157	0.053	0.157	2.963	0.003
	PU	0.065	0.053	0.065	1.219	0.224
	SN	0.006	0.050	0.006	0.115	0.909
	TT	0.157	0.062	0.157	2.554	0.011
	PE	0.083	0.050	0.083	1.656	0.099
	HB	0.315	0.054	0.315	5.806	0.000
	SI	0.216	0.061	0.216	3.567	0.000

a. Dependent Variable: IU

**Table 4.4. Summary of hypotheses testing results**

Hypotheses	Decision
H1: Personalized Learning has a positive impact on users' intention to use the Metaverse Education Application Platform.	Sig. = 0.003 < 0.05 and $\beta = 0.157$ Supported
H2: Situational Teaching has a positive impact on users' intention to use the Metaverse Education Application Platform.	Sig. = 0.000 < 0.05 and $\beta = 0.227$ Supported
H3: Learning Convenience has a positive impact on users' intention to use the Metaverse Education Application Platform.	Sig. = 0.005 < 0.05 and $\beta = 0.160$ Supported
H7: Task - Technology - Fit has a positive impact on users' intention to use the Metaverse Education Application Platform.	Sig. = 0.011 < 0.05 and $\beta = 0.157$ Supported
H8: Habit has a positive impact on users' intention to use the Metaverse Education Application Platform.	Sig. = 0.000 < 0.05 and $\beta = 0.315$ Supported
H9: Social Influence has a positive impact on users' intention to use the Metaverse Education Application Platform.	Sig. = 0.000 < 0.05 and $\beta = 0.216$ Supported

#### 4.1.5. The results of Mean value

To identify the most significant predictor among the observed variables in the research model and propose specific business implications for the Conclusion section, this test utilizes mean values and compares them.

**Table 4.5. The results of Mean value of the remaining valid variables**

Variable	Mean	Variable	Mean	Variable	Mean	Variable	Mean
PL1	3.60	ST1	3.59	LC1	3.58	TT1	3.66
PL2	3.67	ST2	3.74	LC2	3.66	TT2	3.72
PL3	3.78	ST3	3.78			TT3	3.69
		ST4	3.82				
		ST5	3.83				

Variable	Mean	Variable	Mean	Variable	Mean		
HB1	3.55	SI1	3.68	IU1	3.63		
HB2	3.55	SI2	3.71	IU2	3.80		
HB3	3.55	SI3	3.75	IU3	3.75		
HB4	3.42	SI4	3.74	IU4	3.62		

#### 4.2. Discussion

The study successfully applied Push-Pull Theory (PPM), Theory of Rational Action (TRA), Theory of Planned Behavior (TPB) to understand user intention and behavior in adopting the Metaverse Education Application Platform. The team discovered three new variables - Learning Convenience (Push), Task-Technology-Fit (Pull), and Habit - which enhance the PPM model and contribute to users' intention to use the platform. Notably, this study excludes variables from the Technology Acceptance Model (TAM), such as Perceived Ease of Use and Perceived Usefulness. TAM has been extensively researched and applied in various fields, but it doesn't explain the adoption of the Metaverse technology in Vietnam's education sector due to its limited popularity and usage.

The TRA and TPB theories effectively explain the impact of Social Influence on the Intention to Use variable in the context of the Metaverse Education Application Platform. Previous studies have applied these theories to analyze consumer purchase behavior in virtual worlds. By integrating these well-established theories, the research model provides comprehensive coverage for the learner community compared to other models. The study also developed a specific research framework and hierarchical integration model by incorporating the PPM model. This approach allowed for the exploration of significant factors influencing the intention to use the Metaverse Education platform.

This study identifies six key factors that positively predict students' intention to use the Metaverse Education Application Platform. These factors, ranked in descending order of impact, are Habit (HB), Situational Teaching (ST), Social Influence (SI), Learning Convenience (LC), Personalized Learning (PL), and Task-Technology-Fit (TT).

## 5. CONCLUSION

### 5.1. Implication

Firstly, Habit (HB) is the most important factor in the research model, positively predicting Intention to Use (IU) the Metaverse Education Application Platform. The mean values of three observed variables HB1, HB2, HB3 of Habit factor (HB) are all equal. This implies that, learners intending to form a habit of learning through Metaverse Education, they need to use the Metaverse Platform for regular learning. Teachers should create learning habits through the Metaverse Education Application Platform for students, Metaverse should be installed on the student's learning medium. So buying a Metaverse license is important for students to really own to discover things fresh and interesting.

Secondly, Situational Teaching (ST) is the next important factor positively predicting Intention to Use (IU). With the observed variable ST5 having the largest mean value = 3.83 implies that the case-based teaching simulated on the Metaverse platform is interesting, furthermore, it is easier for teachers to guide students with this virtual reality experience method. Therefore, this feature should be utilized for lecturers to incorporate in their lectures to enhance students' concentration, enjoyment and learning performance.

Thirdly, Social Influence (SI) is the third important factor positively predicting Intention to Use (IU). With the observed variable SI3 having the largest mean = 3.75 implies that people who have opinions valued highly by learners will influence Intention to Use (IU). Therefore, educational institutions can take advantage of this to understand the needs of learners for learning applications to enhance interaction and stimulate interest. In addition, companies providing Metaverse services should combine with influential Key Opinion Leaders (KOLs) in the technology world to act as media ambassadors for the educational and educational Metaverse brand to promote this platform to learners more widely.

Fourthly, Learning Convenience (LC) is the next important factor positively predicting Intention to Use (IU). With observed variable LC2 having the largest mean value = 3.66 implies that Metaverse Education is convenient for learners to learn from anywhere. Educational institutions, in addition to providing knowledge to learners through classroom lectures, should design situations or lectures available on the Metaverse platform so that learners can learn anywhere, as long as they feel convenient and flexible for their learning. If learners are absent from class, they can still learn on Metaverse Platform, ensuring knowledge is not interrupted. Besides, business organizations can review and poll employees to apply this technology to remote working management.

Finally, although two factors Personalized Learning (PL) and Task - Technology - Fit (TT) have the least positive impact on Intention to Use but equally important. Personalized Learning (PL) with the largest mean of PL3 = 3.78 and Task - Technology - Fit (TT) with the largest mean of TT2 = 3.72. This implies that learners can find their own way of learning through the Metaverse Education Application Platform. Furthermore, the useful functions of Metaverse Education are enough to assist them in completing their learning tasks. Educational institutions should guide learners to choose learning methods suitable to their goals, so that learners can be oriented and easily access the features that support them to successfully complete their studies.

In short, the Metaverse Application born in this context plays an even more important role in transforming the form of learning and working into a virtual reality environment in the future. The virtual reality environment saves the costs of renting premises, management, and security staff compared to real-life offices. To meet these needs, technology companies like Metaverse should increase their awareness and wide use in the market through marketing on media channels. In order to personalize learning and work, technology companies



should create many useful features so that everyone has the opportunity to familiarize themselves with this new Metaverse Application. The study has accomplished research's objectives with the help of the research findings, and the conclusion has solved all of the research questions that were offered.

## 5.2. Limitation and further research direction

Firstly, this study has provided a fresh perspective on the Metaverse Education Application Platform, but also because of its newness, this application is still unfamiliar to many people, so the number of samples collected is limited. Secondly, this study uses primary data and the questionnaire contains many concepts that have not been properly interpreted, so respondents may not have a clear understanding of the author's intentions, affecting the quality of information and analysis results. Thirdly, the geographical scope is limited and it is not big enough. Fourthly, research methods are limited in diversity, especially data collection methods should control the reliability to assess accurate data. Therefore, future studies should expand the research to other subjects than students and expand the survey scale outside Ho Chi Minh City. Although the three elements of Perceived Usefulness (PU), Perceived Ease Of Use (PE) and Social Needs (SN) are excluded from the research model, they also imply that the Metaverse Education Application Platform should be widely used to have more studies proving the presence of these factors to improve the user experience and their acceptance under the TAM model.

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## FACTORS AFFECTING THE DECISION TO USE THE DATING APPS OF UNIVERSITY STUDENTS IN HO CHI MINH CITY

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**ABSTRACT:** *This research paper investigates the factors influencing the use of dating apps among university students in Ho Chi Minh City by examining the types of dating apps being used, the motivations behind their use, and their impact on students' interpersonal relationships, the study explores the various factors that contribute to the decision to use dating apps among students in Ho Chi Minh City. In Vietnam alone, there are nearly 100 online dating applications, most of which are developed by foreign companies and offer free basic features. To ensure safety while using dating apps, the study examines several key elements that individuals should consider when interacting with others online. The research employs quantitative research methods, utilizing survey questionnaires to collect data from 357 students currently enrolled in universities in HCMC. The collected data is analyzed using TRA (Technology Readiness Assessment), TAM (Technology Acceptance Model), and TPB (Theory of Planned Behavior) models to test the relationship between various observed variables, such as Attitude, Word-of-mouth, Perceived Privacy and Security, Perceived Enjoyment, Perceived Playfulness, Perceived ease of use, and the decision to use a dating app. The findings of the study indicate that variables such as Attitude, Word-of-mouth, Perceived enjoyment, and Perceived playfulness significantly influence the decision to use dating apps. These results contribute to students' understanding of dating app usage and needs while also offering recommendations and solutions for adopting a safe approach when engaging with dating apps and establishing social relationships.*

**Keywords:** *online dating apps, online dating, hookup culture*

### 1. INTRODUCTION

Using a dating app seems to be a popular activity all around the world. Nonetheless, there are still certain stereotypes among students regarding the use of those dating applications. This study was conducted in order to determine what influences students' decisions to choose a dating app. It is the fact that using dating apps is often associated with sexualization, such as in cases involving FWB, ONS, or cheating. In order to determine the true demands, this research investigates the factors that influence student usage of dating apps in Ho Chi Minh City. A series of studies on the decision to use dating apps have been and are being conducted around the world. Accordingly, studies have shown that factors affecting the decision to use dating apps include Attitude, Word-of-mouth, Perceived enjoyment, and Perceived playfulness. On the basis of further development of the past theory in the context of research on the decision to use dating apps, authors such as Kimmel & Kitchen (2014), Hennig-Thurau, Gwinner, Walsh, & Gremler (2004), Chu, Choi (2011), Chu & Kim (2011), Alam, S. S., and Norjaya added the WOM variable in their research, H. Jeff Smith, Tamara Diev and Heng Xu, Huang (2016), Liu et al. (2016) added the variable perceived privacy and security. In addition, if Carol & Thomas (1988), Malone (1981), and Webster (1989) find that Perceived enjoyment has a significant influence on user decisions, then Cha (2011), Cho et al. (2015), Chen et al. (2007) stated that Perceived ease of use also has an impact on the decision of the users to use an application.

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Today, couples meet as a consequence of dating applications, as opposed to the past, when people met and fell in love as a result of fate or just catching each other's looks. Dating apps also change how people interact. However, there are many unfavorable effects of dating apps in addition to the positive ones, especially for today's youth. Dating apps started to appear one by one, steadily upending the norms of traditional dating and making them popular tools. In addition, not many applications are developed with the same intentions due to the model's complexity. While some are evident in that their goal is to find a long-term love partner, others are meant to facilitate short-term friendships and interactions rather than romance. However, people may use applications in ways that are inconsistent with their intended function and may continue for a long time. Finding the variables influencing students' decisions to use dating apps in HCMC is crucial and urgent due to the importance of responding to young people's use of dating apps nowadays.

This study tries to determine the factors affecting students' decision to use dating apps in HCMC, the goals and needs of using dating apps, and recommendations for safe approaches for college students in using dating apps in general. In order to achieve the research objectives, this study has the following specific goals:

- + To realize the level of awareness of students about the concept of dating apps.
- + To measure student interest in dating apps today.
- + To identify the factors affecting the decision to use a dating application and the level of impact of those factors.
- + To understand students' needs for using dating apps, and at the same time propose recommendations and solutions to find a safe approach for young people in finding social relationships on their own

## **2. RESEARCH METHODOLOGY**

### **2.1. Research subject**

Research subject: The decision to use the dating app of university students in Ho Chi Minh City

Research sample: Students studying at universities in Ho Chi Minh City

### **2.2. Research Methods**

This research relied on practice, consulted on controversial issues in today's society, and practical suggestions will always be considered important by our team throughout this study. After choosing a research topic, the group began to search for relevant documents. In order to have the best preparation, as well as a basis to start the research, the group asked and answered questions around the topic.

Starting by making assumptions from presumptive models and available studies, with suitable hypotheses, the team conducts testing with actual data from the survey questionnaire. Continuing with the establishment of a survey questionnaire, the questions and measurement methods used in this paper are mainly adapted from relevant previous studies and through group observations in the current situation. All items were measured using a five-point Likert scale, with scores ranging from "strongly disagree" to "strongly agree". In addition, we also provide some demographic information and personal habits from which to test the difference between the above factors in the decision to use the dating application. After preparing the questionnaire from the survey results and preliminary research, the research team continued to the qualitative research stage to test the research hypotheses obtained from the theoretical basis and measure the influence of the factors between the relationships through a random survey of students belonging to universities in HCMC using a survey form via Google Form. The survey was conducted from December

2022 to February 2023, with 357 respondents who are students studying at universities in HCMC. The information, data, and research results will be based on survey questionnaires in the form of an online survey and through social networking platforms such as Facebook and Zalo.

The research team collected qualitative results based on variables, including:

- Six independent variables: Attitude, Word-of-mouth, Perceived privacy and security, Perceived enjoyment, Perceived playfulness, Perceived ease of use
- One dependent variable: Decision on using dating apps

### **3. THEORETICAL FRAMEWORK**

#### **3.1. Theoretical basis of the topic**

##### **3.1.1. *The concept of dating apps***

Dating apps are software applications designed to generate connections between people who are interested in romance, casual sex, or friendship (Treena Orchard). Dating apps appeared in 2003 and grew in popularity from 2007 to 2008 (Quinoz, 2013) with the introduction of the Apple iPhone and the first App Store. Numerous dating apps have been created with the aim of relieving stress and helping users find their soulmate, or sometimes just a soulmate.

##### **3.1.2. *The concept of online dating***

Dating was “upgraded” in the 4.0 era by adding a brand-new type: dating through social networks. The idea of online dating applications can be attributed to the growing usage of cellphones, Internet connectivity, and GPS. By providing information about yourself or responding to someone else’s information, you can establish a love relationship online through online dating. However, online dating also has many downsides. If we only look at dating applications as a tool to make friends and lovers, we are purposefully excluding one of the primary motivations for why many people use them: sex or one-night stands. Therefore, finding safe approaches to using dating apps, in general, is essential.

##### **3.1.3. *The concept of Hookup culture***

Uncommitted sexual encounters, also known as hookups, are becoming more common in popular culture as a result of shifting social and sexual norms as well as evolving sexual preferences. A manner of life known as “hookup culture” promotes and entails informal, transient connections between uncommitted individuals. Since mating has traditionally been the major goal of sexual activity in order to allow reproduction and the genetic continuation of genes, long-term relationships have historically been prized. The satisfying of physical and emotional needs is another motive other than just reproduction for having sex (Birnbaum and Gillath 2006). Over the past 60 years, a number of cultures have liberalized their views on sexuality, and the use of birth control (such as condoms and oral contraceptives) has increased (Garcia et al. 2012). The significance of the sexual goals of physical pleasure and emotional fulfillment has increased as a result of these developments.

#### **3.2. Theoretical models of research**

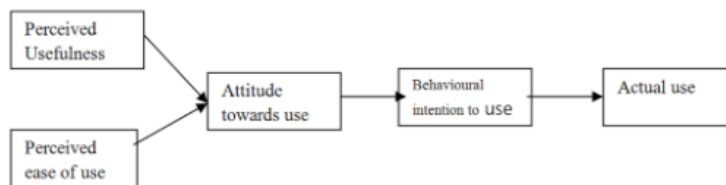
##### **3.2.1. *The Technology Acceptance Model (TAM)***

TAM is a widely accepted theoretical framework that is used to assess the variables influencing the adoption of information systems and to explain user acceptance behavior for various information systems and technologies. TAM takes into account the perceived utility and perceived usability of information systems as two fundamental elements that affect users’ intentions to accept or reject information systems.

Technology user acceptability is dependent on perception, which influences intention and action. The model is based on the supposition that user attitudes influence whether information technology is accepted or rejected; user attitudes are influenced by perceived ease of use and perceived usefulness, and when technology is perceived as being easy to use, users perceive its usefulness. Many scholars utilize and reference this idea while examining and explicating technology usage behavior (Y. Lee, Kozar, & Larsen, 2003). Perceived usefulness and perceived ease of use, in line with TAM, have a direct impact on attitude. Attitude impacts intention to use, which in turn affects the behavior of embracing information technology systems or services (Wu and Wang, 2005).

**Figure 3.1.**

*The technology acceptance model - TAM*



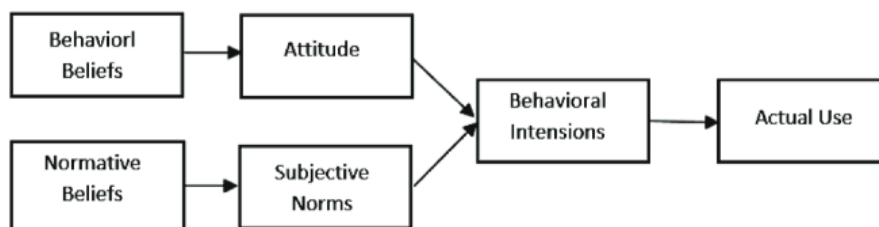
*Note: Adapted from Davis et al. (1989).*

**3.2.2. The theory of reasoned action (TRA)**

The TRA was created by Fishbein and Ajzen (1975). According to this theory, behavioral intentions drive action, and intentions are influenced by both personal attitudes toward the activity and the subjective norms that surround its execution. Behavior-related intentions are influenced by attitudes and subjective norms. In which attitude is the manifestation of particular elements that represent the consumers’ favorable opinions. The subjective normative measure measures how consumers feel about the people who have an impact on their behavioral tendencies, demonstrating the role that social relationships play. Consumers’ consumption tendencies are both substantially and weakly influenced by how much they trust their acquaintances. In this theory, individual consumer beliefs about a product or brand will influence attitudes toward behavior, and attitudes toward behavior will influence buying propensity, which does not directly affect buying behavior. Therefore, attitude will explain the reasons leading to consumers’ buying tendencies, and trends are the best factor to explain consumer behavior trends. The results of these two factors form the intention to perform the behavior. Applying TRA, a number of studies have discovered that the decision to use information technology applications and the actual system is strongly influenced by the predecessors (Alam, Syed Shah, et al. (2018)).

**Figure 3.2.**

*Theory of Reasoned Action - TRA*



*Note: Developed by Ajzen and Fishbein (Ajzen, 2011).*

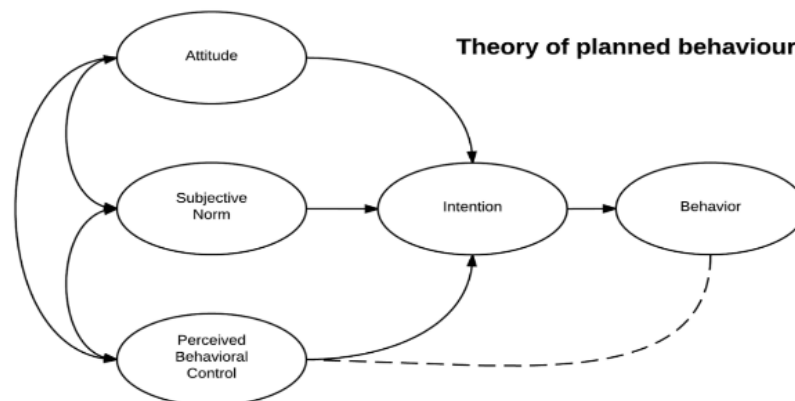


### 3.2.3. Theory of Planned Behavior - TPB

TPB was developed from TRA (Ajzen and Fishbein, 1975), which was created due to the previous theory's limitation on the assumption that human behavior is purely by mind control. According to this theory, individuals are grounded and motivated in their decision-making and make a rational choice between solutions. The best tool for predicting behavior is intention; and behavior is determined by a person's behavioral intention (BI). Ajzen suggested that behavioral control factors directly affect the tendency to perform the behavior and that if the person is accurate in his perception of the degree of control, then behavioral control also predicts the behavior. TPB model is evaluated to be more optimal than TRA model because TPB overcomes the disadvantages of the TRA by adding factors controlling cognitive behavior. In the world, this model has been widely used for a long time and has been practically verified through the scientific work of famous researchers.

Figure 3.3.

*Theory of Planned Behavior - TPB*



*Note: Adapted from Ajzen (2005).*

## 4. RESEARCH MODEL

### 4.1. Hypothesis of research model

#### 4.1.1. Attitude

A statement that a person's actions are determined by his/her behavioral intentions, which are influenced by attitudes toward that behavior. Theory of Reasoned Action (TRA) and the theory of planned behavior (TPB) developed by Ajzen and Fishbein take into account individuals' attitudes and social norms as well as the individual's ability to control perceptions as factors that accurately predict behavioral intention. Empirical studies have supported this theory, according to them, intention is a good predictor of behavior. Attitude towards a behavioral element is a judgment of positive or negative assessment of behavior based on the belief that the individual possesses the necessary opportunities and resources to engage in such behavior. Attitudes towards online dating sites are found to influence the intention to use the websites. In general, the more favorable the attitude towards behavior, the more favorable the intention to adopt it. Hence, it was coined that:

***Hypothesis 1: Attitude has a positive influence on intention to use online dating sites.***

#### 4.1.2. Word-of-mouth (WOM)

Since research participants joined the dialogue, an oral tradition has been the foundation of WOM (Kimmel & Kitchen, 2014). (Arndt, 1967a, p. 190; Engel et al., 1969; Gruen, Osmonbekov, & Czapski, 2006; Katz & Lazarfeld, 1955) Defined as person-to-person verbal communication between

a non-commercial communicator and a recipient regarding a brand, product, or service provided for sale. Electronic WOM, also known as eWOM, is a new type of WOM that was brought about by the development of the Internet. It occurs online and enables interactions between customers, who are frequently strangers. eWOM is defined as any positive or negative statement made by potential, actual or past customers about a product or company, made available to many people and organizations through the internet ( Hennig-Thurau, Gwinner, Walsh, & Gremler, 2004, p.39). This user-experience communication increasingly influences consumer usage decisions and has shifted the power of influence from the marketers to the users, who seek the opinions of other consumers and form their own (Chu & Choi), 2011). Besides, a study by Alam, S. S., and Norjaya, M. Y. demonstrates that WOM is also seen as a potential method of communication in a rising e-commerce economy, and also becomes highly essential and significantly affects customer trust.

***Hypothesis 2: Word-of-mouth positively influences students' decision to use dating apps***

#### **4.1.3. Perceived privacy and security**

Mukherjee and Nath (2007) identified that the privacy and security features of the website are the key antecedents of trust, which in turn positively influences the behavioral intentions of customers. Self-disclosure is an important element in both real life and online dating; it can be characterized as the voluntary sharing of personal information, such as sentiments and experiences (Huang 2016). However, Liu et al. (2016) found that self-disclosure on Facebook differs from other micro-blogging social media like Twitter and Tumblr in terms of usage trends. Liu et al. (2016) underline that elements that affect one's self-disclosure on social media with follower-based include similarity or interest in a field in their research. Online users increasingly find themselves at risk in their online activities. A large number of individuals using the Internet have serious privacy concerns, and gaining public trust is a major barrier to the continued growth of dating apps. According to a report by the Norwegian Consumer Council 2020, popular dating apps including Tinder, Grindr, OkCupid, etc. have transferred users' personal data to advertising and marketing companies – a violation of the European Union's General Data Privacy Regulation (GDPR), Union (EU). The results show that consumers value security features significantly more than the other three trust metrics.

***Hypothesis 3: Perceived privacy and security are essential to the confidence level of consumers willing to provide personal information to dating apps.***

#### **4.1.4. Perceived enjoyment**

Perceived enjoyment is defined as the degree to which the activity of computer use is perceived as pleasurable in its own right, beyond any predictable performance consequences (Carol & Thomas, 1988; Deci, 1971; Malone, 1981). A person will be more interested in doing or repeating an activity they find enjoyable than doing an uninteresting activity. This is supported by the work of Triandis (1971, 1980 as cited in Teo, 1999), who argues that feelings of joy, euphoria, delight or discouragement, disgust, dissatisfaction and an individual's hatred of a particular action has influenced many researchers who have studied the importance of enjoyment in the workplace (e.g. Webster, 1989; Webster & Martocchio, 1992; Malone 1981) considered interesting. Interest reflects the part of the enjoyment of any technology that is perceived by consumers when they tend to use that technology. Either way, it increases the chances of being satisfied and can lead to a habit of using that technology especially in the case of hedonistic applications.

***Hypothesis 4: Perceived enjoyment is positively related to behavioral intention in using dating apps.***

#### 4.1.5. Perceived playfulness

The hedonic and behavioral intention components are related. Hedonic factors consist of two elements: joy and playfulness. In TAM, the concept of subjective satisfaction was included to clearly construct the role of intrinsic motivation. This idea clarifies the extent to which utilizing a certain commodity or service is considered enjoyable by customers. Perceived pleasure was found to have a favorable impact on Internet users in a Singapore study. In the latter research, it was shown that hedonic elements, such as consumers' judgments of fun or playfulness, significantly influenced how they felt about utilizing a system.

**Hypothesis 5: Perceived playfulness has a positive influence on intention to use online dating sites.**

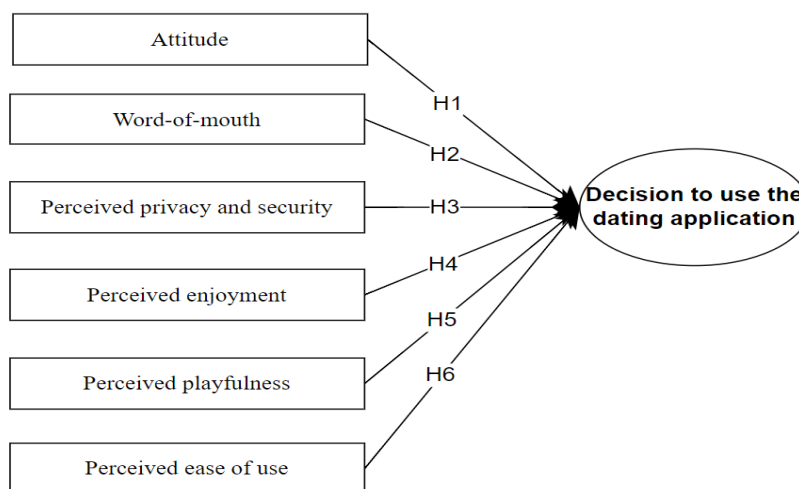
#### 4.1.6. Perceived ease of use

Some individuals see online dating as shopping. They peruse photos in quest of the perfect mate. According to Cha (2011), a person's decision to make an online purchase depends on a variety of factors, including gender, social norms, flow, rewards, perceived ease of use, enjoyment, and security. Customers are more inclined to purchase online when online businesses are simple to use and the checkout process is rapid, according to a study by Cho et al. (2015). Perceived simplicity of use has a big impact on customers' propensity to purchase online (Chen et al., 2007). But, an app's usability is just as important as its layout, website aesthetics, and reputation. The number of users increases as a result of trust being positively impacted by simplicity or ease of use.

**Hypothesis 6: Perceived ease of use has a positive and significant impact on usage behavior**

**Figure 4.1.**

*The proposed research model*



Interpretation of the proposed research model:

H1: Attitude has a positive influence on the intention to use online dating sites.

H2: Word-of-mouth positively influences students' decision to use dating apps

H3: Perceived privacy and security are essential to the confidence level of consumers willing to provide personal information to dating apps.

H4: Perceived enjoyment is positively related to behavioral intention in using dating apps.

H5: Perceived playfulness has a positive influence on the intention to use online dating sites.

H6: Perceived ease of use has a positive and significant impact on usage behavior.

**4.2. Proposed research scale and questionnaire**

The Likert scale is a useful instrument for measuring and assessing each person’s view and opinion on a range of issues based on the degree of agreement. The study team utilized a 5-point Likert scale with the following 5 answer choices:

Level 1 = Totally disagree; Level 2 = Disagree; Level 3 = Normal; Level 4 = Agree; Level 5 = Totally agree

The scales were developed based on earlier research studies, after which part of the material was modified to fit the study report. They are presented in Table 5.2

**5. RESEARCH RESULTS**

**5.1. Descriptive statistical analysis**

**Table 5.1.**

*Survey respondents' personal information.*

General Information		Frequency	Valid Percent
Gender	Male	145	40.6
	Female	212	59.4
Academic year	Freshman	107	30.0
	Sophomore	75	21.0
	Junior	142	39.8
	Senior	33	9.2
Have you ever heard about dating apps?	Yes	289	81.0
	No	68	19.0
Have you ever used dating apps?	Yes	94	26.3
	No	173	48.5
	Used to	90	25.2
How long since the date you used the dating app?	< 3 months	79	47.9
	3 - 7 months	51	30.9
	8 - 12 months	9	5.5
	> 12 months	26	15.8
How much time do you spend on dating apps?	1 - 2 hours/ day	151	91.5
	1- 4 hours/ day	13	7.9
	> 6 hours/ day	1	0.6

All of the 357 responses to the survey’s data had reliable results, according to the data. The bulk of them (81%), who are mostly female (59.4%), have heard of dating apps. To be more precise, the study included 25.2% of respondents who had used dating apps, 26.3% of those who were currently using them, and 48.5% of those who had never used them. Additionally, the majority of them (30.8%) and (39.8%) are Freshmen. 9.2% of respondents are Seniors, and the remaining 21% are Sophomores. The majority of them (47.9%) have only used dating apps for three months or less; just over 31% of respondents have used them for three to seven months; roughly 15.8% have used them for more than twelve months; and the remaining 5.5% of respondents have used them for eight to twelve months. More than 90% of respondents reported using dating apps for one to two hours per day, 7.9% for one to 6 hours per day, and 0.6% for more than 6 hours per day.

**5.2. Checking the reliability of the scale by Cronbach’s Alpha coefficient**

All scales pass the test used to establish the reliability of the scale since their Cronbach's Alpha coefficients are significant at the required level of 0.6. Because the correlation coefficient for the total variable is greater than 0.3, the observed variables of the factors ATT, PP, PEU, and DTU are all acceptable.

The test results indicate that the significant variables are not only those with reliability coefficients of Cronbach's Alpha scales of WOM5 (.640), PPS1 (.732), and PE1 (.821). The variable total correlation for this observation (Corrected Item - Total Correlation) is less than 0.3. As a result, the scale will not include the observed variables WOM5, PPS1, and PE1 because they only partially account for the DTU component. The second Cronbach's Alpha analysis was performed and the criteria were satisfied. Thus, the scale is reliable, and all observed variables have good explanations for the DTU factor.

**Table 5.2.**

*The results of the scale reliability assessment (Cronbach's Alpha)*

DTU	<b>Decision to use</b>	.799		
DTU1	Creating a dating relationship on dating app is a good idea		.341	.859
DTU2	I feel comfortable using dating apps		.688	.731
DTU3	If there is a need, I would consider using a dating app		.558	.770
DTU4	I will definitely try out the dating app in the future		.738	.712
DTU5	I will continue to use the dating app in the future.		.699	.725
Scales		Cronbach's Alpha	Total Correlation	if Item Deleted
ATT	<b>Attitude towards using dating apps</b>	.726		
ATT1	I find that the dating app helps me find a date		.658	.608
ATT2	I find that the dating app will help me find true love		.537	.658
ATT3	The majority of people who join the dating app are not aiming for a serious relationship		.460	.689
ATT4	I use dating apps to expand my relationship		.408	.712
ATT5	Dating app connections lead to toxic relationships		.381	.717
WOM	<b>Word of mouth of dating apps</b>	.640		
WOM1	I was known about the apps through friends and relatives		.506	.529
WOM2	Some of my friends recommend me to use dating apps		.510	.532
WOM3	I trust what my friends and relatives say about dating apps		.450	.563
WOM4	Someone who has had a bad experience with a dating app		.399	.585
WOM5	Other people look for relationships like FWB,ONS		.171	.710
PPS	<b>Perceived privacy and security</b>	.732		
PPS1	I feel comfortable sharing personal information on the app		.218	.775
PPS2	I control the information I want to share		.598	.643
PPS3	User identity is verified		.497	.685
PPS4	I am provided with complete privacy policy of the app		.629	.629
PPS5	Dating apps always do what they promise		.533	.670
PE	<b>Perceived enjoyment</b>	.821		
PE1	I find using dating apps very interesting		.275	.863
PE2	I spend a lot of time on this app		.574	.799
PE3	Dating apps can help me relax by sharing with others		.738	.746
PE4	I enjoy my time using the app		.757	.744
PE5	I find using dating apps to be entertaining		.740	.746
PP	<b>Perceived playfulness</b>	.849		
PP1	I don't realize how much time has passed		.626	.827
PP2	I often forget what I need to do		.304	.897
PP3	Interacting with dating apps is really excited		.803	.779
PP4	Interacting with dating apps is fun		.831	.770
PP5	Interacting with the dating app makes me want to explore		.757	.791
PEU	<b>Perceived ease of use</b>	.860		
PEU1	Dating application has a simple interface that is easy to see		.780	.803
PEU2	Dating application has all the necessary features for users		.778	.803
PEU3	Dating app features are easy to operate		.746	.813
PEU4	I can see all the information I need		.446	.881
PEU5	I find this to be a user-friendly app		.642	.840

Source: SPSS Analysis

### 5.3. Exploratory factor analysis (EFA)

#### 5.3.1. Exploratory factor analysis (EFA) for the independent variable

The factor extraction method used is Principal Components with Varimax rotation. The analysis's results are as follows:

**Table 5.3.1.1.**

*KMO coefficient and Bartlett Test of independent variables in the first time*

KMO and Bartlett's Test			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Bartlett's Test of Sphericity		
.910	Approx. Chi-Square	df	Sig.
	4064.061	315	.000

*Source: SPSS Analysis*

The results of testing the independent variables of KMO and Bartlett are shown in the table above:

- The results of the SPSS analysis show that the factor analysis is consistent with the research data when the KMO value is 0.911, greater than 0.5 and less than 1.
- Barlett's test has significance level sig = 0.000 < 0.05, proving that the data used for factor analysis are appropriate and that the variables are correlated with each other, from which we can reject the hypothesis H0: observed variables not correlated with each other.

Perform factor analysis according to Principal components with Varimax rotation. The results show that the observed variables are initially grouped into 6 groups:

**Table 5.3.1.2.**

*Total Variance Explained of independent variables in the first time*

Factors	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	9.812	36.340	36.340	9.812	36.340	36.340	4.784
2	2.265	8.390	44.730	2.265	8.390	44.730	4.637
3	1.793	6.639	51.369	1.793	6.639	51.369	2.585
4	1.369	5.070	56.439	1.369	5.070	56.439	2.195
5	1.179	4.365	60.804	1.179	4.365	60.804	1.944
6	<b>1.073</b>	3.975	64.779	1.073	3.975	<b>64.779</b>	1.345
7	.937	3.470	68.249				
8	.832	3.083	71.331				
9	.800	2.963	74.295				
...	...	...	...				

*Source: SPSS Analysis*

The analysis results show that the original 27 observed variables are divided into 6 groups. Eigenvalues of all factors are greater than 1, factor 6 has the lowest Eigenvalues of 1,073. The total extracted variance value is 64.779% > 50%, showing that the EFA model is suitable. This value explains 64.779% of the variability of the data.

**Table 5.3.1.3.***Result of factor analysis for independent variables for the first time*

	Rotated Component Matrix Component					
	1	2	3	4	5	6
PE3	.772					
PE2	.768					
PE4	.764					
PE5	.747					
PP1	.733					
PP5	.635	.576				
PP4	.629	.605				
PP2						
PEU1		.799				
PEU2		.737				
PEU3		.720				
PEU5		.662				
<b>PP3</b>	.588	.646				
PPS5		.521				
PPS3			.721			
PPS4			.623			
PPS2			.619			
WOM2				.688		
WOM1				.672		
WOM3				.648		
ATT4					.578	
<b>PEU4</b>					.577	
<b>WOM4</b>					.571	
ATT2						
ATT3						.657
ATT1						-.643
ATT5						.593

*Source: SPSS Analysis*

The results of the first EFA show that the independent variables are divided into 6 factor groups after rotating 27 observed variables. Realizing that there are 3 confused variables that need to be considered and fixed.

#### **Factor convergence correction**

The research team found that the observed variable and the factors converged among other factors, notably PP3, PEU4, WOM4. This phenomenon can occur for one of the following reasons:

Cause 1: The questionnaire is not constructed clearly, the questions are relatively similar, leading to misunderstandings for survey takers, thereby making this variable separate, not showing the same common property with the remaining observed variables in the original group.

Cause 2: Survey takers do not focus on the question, leading to incorrect answers

After comparison and consideration, the new factor labeling method was used before moving on to the next study. Specifically, the research team will remove unsuitable factors and name the observed variables that converge depending on their attributes. Specifically, the variable PP3 was mixed between PEU and

PPS based on survey questions and study findings; nevertheless, the PP3 factor’s significance for these two observed variables was not comparable. As a result, the group chose the PP3 variable type.

In a similar vein, the names and definitions of the mixed variables PEU4 and WOM4 in the ATT factor group, ATT7 and ATT6, are comparable. And to keep monitoring, the remaining variables are constantly adjusted. The results of the EFA factor analysis stopped at the second implementation after removing the observed variable PP3 because of confusion and convergence in other factors. In general, due to changes in the remaining components, there are also some changes in variable names as mentioned above. Thus, after preliminary assessment, the total decision to use dating app scale includes 6 independent variables, respectively: ATT, WOM, PPS, PE, PP, PEU with 26 observed variables. All observed variables of this scale meet the requirements due to the factor loading coefficient (Factor loading) > 0.4 and are included in conducting CFA analysis.

**5.3.2. Exploratory factor analysis (EFA) for the dependent variable**

**Table 5.3.2.1.**

*KMO coefficient and Bartlett Test of independent variables for the first time*

KMO and Bartlett's Test			
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Bartlett's Test of Szphericity		
.910	Approx. Chi-Square	df	Sig.
	4064.061	315	.000

The results of the SPSS analysis show that the factor analysis is consistent with the research data when  $KMO = 0.796 > 0.5$ . With a significance level of  $Sig = 0.000 < 0.5$ , the results of Bartlett’s test show that the observed variables in the group are correlated with each other.

**Table 5.3.2.2.**

*Total Variance Explained for independent variables*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	<b>2.982</b>	59.649	59.649	2.982	59.649	<b>59.649</b>
2	.836	16.719	76.368			
3	.611	12.210	88.578			
4	.359	7.188	95.766			
5	.212	4.234	100.000			

Source: SPSS Analysis



**Table 5.3.2.3.***Component matrix for independent variables*

	Component
	1
DTU4	.882
DTU5	.856
DTU2	.845
DTU3	.727
DTU1	.479

*Source: SPSS Analysis*

The analysis results show that there is a factor extracted at eigenvalue equal to  $2.982 > 1$ . It proves that this factor explains 59,649% of the data variation of 5 observed variables participating in EFA.

From the analysis results, the first variables meet the requirements of EFA analysis with factor loading coefficients all greater than 0.4. As a result, no variables are dropped, and the model stays the same.

## 5.4 Regression analysis

### 5.4.1. Testing the linear regression between variables

**Table 5.4.1.***Matrix of linear correlation between variables*

		Correlation						
		DTU	PE	PP	PEU	PSS	WOM	ATT
DTU	Pearson Correlation	1	.512**	.522**	.443**	.462**	.477**	.464**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000
PE		.512**	1	.805**	.501**	.428**	.452**	.400**
		.000		.000	.000	.000	.000	.000
PP		.522**	.805**	1	.624**	.512**	.415**	.464**
		.000	.000		.000	.000	.000	.000
PEU		.443**	.501**	.624**	1	.642**	.551**	.410**
		.000	.000	.000		.000	.000	.000
PPS		.462**	.428**	.512**	.642**	1	.515**	.523**
		.000	.000	.000	.000		.000	.000
WOM		.477**	.452**	.415**	.551**	.515**	1	.400**
		.000	.000	.000	.000	.000		.000
ATT		.464**	.400**	.464**	.410**	.523**	.400**	1
		.000	.000	.000	.000	.000	.000	

*Source: SPSS Analysis*

The research team discovered that factors Attitude (ATT), Word-of-mouth factor (WOM), Perceived enjoyment factor (PE) and Perceived playfulness factor (PP), Perceived ease of use (PEU) with factor Perceived of privacy and security (PPS), have a good correlation with factor Decision to use the dating application (DTU), in which the Pearson correlation relationship between variable Attitude and variable Decision t was found to exist, in which, the Pearson correlation relationship between variable Attitude and variable Decision to use factors is  $r = 0.464$ , the Pearson correlation relationship between variable Word-of-mouth and variable Decision to use factors is  $r = 0.477$ , the Pearson correlation relationship between variable Decision to use and variable Perceived of privacy and security factors is  $r = 0.462$ , and

the Pearson correlation relationship between variable Decision to use and variable Perceived ease of use factors, Perceived playfulness factors and Perceived enjoyment factors is respectively 0.443, 0.522, 0.512. In particular, all the Sig coefficients are less than 0.05, which ensures a significant correlation between the variables for the research team to run the linear regression model.

5.4.2. Linear regression analysis

A linear regression function was used with a single input method to test the concordance between the decision variable using a dating app and the observed variables.

**Table 5.4.2.1.**

*Result of regression model*

Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.634	.403	.390	.51767	1.829
a. Predictors: (Constant), ATT, PE, WOM, PEU, PSS, PP					
b. Dependent Variable: DTU					

*Source: SPSS Analysis*

The research team found that the variables Attitude (ATT), Word-of-mouth (WOM), Perceived Enjoyment (PE), Perceived Playfulness (PP), Perceived Ease of Use (PEU), and Perceived of Privacy and Security (PPS) have a good correlation with the variable Decision to Use the Dating Application (DTU), in which the Pearson correlation relationship between variable Attitude and variable Decision t was found to exist. It can be determined by looking at the findings of R squared (R Square) and R squared (Adjusted R Square) in the Model Summary table. According to the adjusted R-squared value of 0.390, the independent variables used in the regression analysis account for 39.0% of the variation in the dependent variable, while random errors and out-of-model variables account for the remaining 61.0%. The results of this table also give Durbin–Watson values to evaluate the phenomenon of first-order series autocorrelation. The value DW = 1.829, is in the range of 1.5 to 2.5, so the results do not violate the assumption of first-order series autocorrelation.

**Table 5.4.2.2.**

*Variance analysis*

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	51.465	6	8.578	32.008	.000
Residual	76.375	285	.268		
Total	127.840	291			

*Source: SPSS Analysis*

*Source: SPSS Analysis*

The table ANOVA provides information about the regression model fit, the table gives us the results of the F test to evaluate the fit hypothesis of the regression model. The F-test sig value is 0.000 < 0.05, so the regression model is suitable.

**Table 5.4.2.3.**

*Regression coefficient results*

Coefficients					
Model		t	Sig.	Collinearity Statistics	
				Tolerance	VIF
1	(Constant)	2.428	.016		
	PE	2.210	.028	.332	3.009
	PP	1.775	.077	.273	3.658
	PEU	.062	.950	.429	2.331
	PPS	1.568	.118	.485	2.064
	WOM	3.423	.001	.600	1.666
	ATT	3.274	.001	.660	1.514

Source: SPSS Analysis

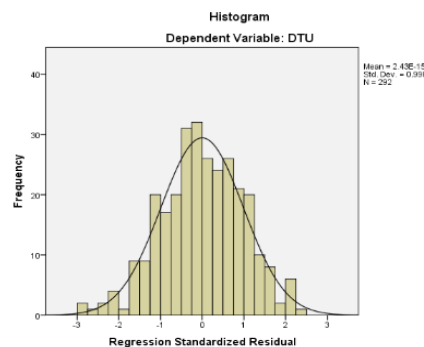
The significance of each independent variable’s regression coefficient in the model will be assessed using the t (student) test. The regression H0: The regression coefficient for the independent variable Xi is equal to zero. As there are many independent variables, we will test multiple H0 hypotheses. Inspection results The dependent variable is affected by the variable X1 if the regression coefficient of the independent variable, Xi, is statistically different from zero.

- If Sig 0.05: Reject the hypothesis H0.
- If Sig > 0.05:Accept that there is no association between the independent and dependent variables and that the independent variable Xi’s regression coefficient is zero.

The Coefficients table includes the regression coefficients, the VIF index to assess multicollinearity, and the t-test results for testing the significance of the regression coefficient hypothesis. The dependent variable Decision to use DTU is not affected by the independent variables Perceived ease of use (PEU) or Perceived privacy and security (PPS), which have sig test sig values of 0.950 > 0.05 and 0.118 > 0.05, respectively. With t-test sig values below 0.05, the remaining variables—attitude, word-of-mouth, perceived playfulness traits, and felt enjoyment—are all statistically significant and have an impact on the dependent variable DTU. The fact that all of these independent variables have positive regression coefficients demonstrates that they have a positive influence on the dependent variable. The VIP coefficients of the independent variables and all lose chum 10, so the data does not violate the assumption of multicollinearity (Hair et al, 2009).

**Figure 5.1.**

*Histogram Regression Standardized*



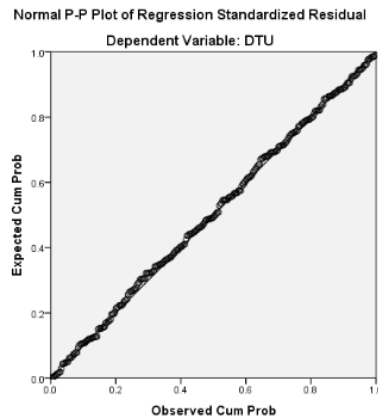
Source: SPSS Analysis

The chart provides result Mean = 2.34E-15 = 2.34 \* 10^-15 = 0.00000... which is close to 0, standard

deviation is 0.990 which is close to 1. Thus, it can be said that the residual distribution is approximately normal, assuming a normal distribution of residuals is not violated.

**Figure 5.2.**

*Normal P-P Plot Residual plot*



*Source: SPSS Analysis*

The chart gives information about the residual data points, which are concentrated quite close to the diagonal, so the residuals have an approximate normal distribution, assuming the normal distribution of the residuals is not violated.

**5.5. Analyzing the influence of demographic variables on the decision to use dating apps using T-test and ANOVA**

**5.5.1. Testing for differences by gender**

**Table 5.5.1.1.**

*Result of testing difference by Gender*

	GENDER	N	GENDER	N
DTU	Male	111	Female	181

*Source: SPSS Analysis*

**Table 5.5.1.2.**

*Result of Levene test by Gender*

	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	1.592	.208	-2.180	290	.030
Equal variances not assumed			-2.209	242.870	.028

*Source: SPSS Analysis*

The results show the Sig. Levene's Test = 0.208 > 0.05 and Sig.(2-tailed) = 0.030 < 0.05. So, there is a significant difference in the current student's decision to use a dating app by gender.

**5.5.2. Test for age difference by Academic year**

**Table 5.5.2.1.***Results of Levene test by Academic year*

Test of Homogeneity of Variance			
Levene Statistic	df1	df2	Sig.
.867	3	288	.459

*Source: SPSS Analysis*

The Levene's Test outcome demonstrates that Sig value = 0.459 > 0.05. This means the variables are similar, so it prevents the rejection of hypothesis  $H_0$ . As a result, we do not have enough evidence to determine the difference in decision-making under the influence of the academic year.

**Table 5.5.2.2.***Average Values by Academic year*

Descriptives			
	N		N
1 <sup>st</sup> year	71	3 <sup>rd</sup> year	123
2 <sup>nd</sup> year	65	4 <sup>th</sup> year	33
Total	292		

*Source: SPSS Analysis*

The survey results show that the higher academic year, the higher the Mean value. This also implies that the higher the student's academic year, the higher they need to use dating apps.

### 5.5.3. Testing for differences by reasons to use dating apps

**Table 5.5.3.***Average Values by reasons to use dating apps*

	Responses	
	N	Percent
Find friend	82	32.7%
Find an exclusive	99	39.4%
Hookup	53	21.1%
Other	17	6.8%
Total	251	100.0%

*Source: SPSS Analysis*

Based on the observations, it is found that students tend to use dating apps to meet new people, and the app's assessment of a person's personality and relationship qualities is reasonable. The percentage of people for whom hooking up is just less common than making friends and love matches is 21.1%. Warnings are required for users who have other reasons, or simply those who do not have social experiences, even though the application platform is monitored for safety. These users mostly include those who do not have a lot of toxic interactions. Users that use it for unclear reasons account for the lowest percentage, which is just 6.8%.

### 5.5.4. Testing for differences by status relationship

**Table 5.5.4.1.**

*Results of Levene test by status relationship*

Test of Homogeneity of Variance			
Levene Statistic	df1	df2	Sig.
20.672	3	285	.000

*Source: SPSS Analysis*

The Levene’s Test outcome demonstrates that Sig value = 0 < 0.05. This means the variables are different. Therefore, we look at the Robust Test result presented in the table below.

**Table 5.5.4.2.**

*Results of Robust Test by status relationship*

Robust Tests of Equality of Means				
	Statistica	df1	df2	Sig.
Welch	6.459	3	37.887	.001

*Source: SPSS Analysis*

The table Results of Robust Test by Status Relationship presented that Sig.Welch = 0.001 < 0.05 proved that the decision to use dating applications varies depending on relationship status.

**Table 5.5.4.3.**

*Average Values by status relationship*

Descriptives		
	N	Mean
Single	171	3.25
Dating	82	3.95
Chat up	11	4.45
Complicated	25	3.68
Total	292	3.53

*Source: SPSS Analysis*

According to the aforementioned facts, the vast majority of people who are classified as chat ups use the highest Mean number. Furthermore, it suggests that people involved in inquiry connections have high utilization desires. The number of students in “romantic relationships” is also second only to “chat up” in terms of mean value.

**5.6. Conclusion of the research results**

After empirically confirming Cronbach’s alpha scale with SPSS statistics. According to studies, the two main motivations for students in HCMC to use dating apps are to find real love and make new acquaintances. According to the study, 4 factors affect students’ plans to use the application in HCMC, while 2 out of 6 hypotheses had no bearing on their intentions. Thus, there are a total of six hypotheses in the study, of which the research team accepts four while rejecting the other two. The test results are summarized in the table that follows.

**Table 5.6.**

*Summary of hypothesis testing results*

Hypothesis	Evaluate
H1: Attitude has a positive influence on intention to use online dating sites.	Agree
H2: Word-of-mouth positively influences students' decision to use dating apps at universities	Agree
H3: Perceived privacy and security essential to the confidence level of consumers willing to provide personal information to dating apps.	Disagree
H4: Perceived enjoyment is positively related to behavioral intention in using dating apps.	Agree
H5: Perceived playfulness has a positive influence on intention to use online dating sites.	Agree
H6: Perceived ease of use has a positive and significant impact on usage behavior.	Disagree

**6. CONCLUSION AND RECOMMENDATIONS****6.1. Conclusion**

In order to better understand how young people in Ho Chi Minh City use online dating services, this study has taken a survey-style approach. Six factors, including attitude, word-of-mouth, perception of privacy and security, perception of enjoyment, perception of fun, and simplicity of use, were identified in the article. On the positive side, the use of dating applications has met the practical needs of some users, especially those who are so busy that they have little time for meeting, learning or personal interactions. Online chats can be a better way to start a conversation and get to know each other, as face-to-face matchmaking can often be embarrassing. Besides, the opponent's information is publicly displayed on their profile. However, there are a lot of drawbacks to using dating apps. The information that users provide into the app is not validated, so it could not be accurate. Other dangers include fraud, data leakage threats, and the misuse of dating apps for immoral purposes. Additionally, there are advertisements to purchase program upgrade packages, along with the difficulties of utilizing the application. This causes discomfort during the process.

Using a dating app is still controversial. The way we socialize and meet new people is changing significantly; consequently, it takes a long, sincere, and patient experience from both partners on both sides to become a long-term friend. This is especially true for the purpose of finding the ideal match, whether through an online application or face-to-face. When accepting new friendship offers, particularly through online dating apps, it is crucial for each person to establish a balance between sincerity and increased caution.

**6.2. Recommendations**

Several recommendations can be made based on the research's findings to help students readily make choices regarding the use of dating applications, dispel misconceptions about them, and find a safe approach for college students when using dating apps. Firstly, the government needs to come up with cybersecurity policies. Nowadays, the dangers of the internet grow in direct relation to the advancement of modern technology. Therefore, it is crucial and imperative to ensure information security, network security, and the prevention of cybercrime and legal breaches online. At the same time, it's important to increase knowledge among all citizens, businesses, agencies, and organizations; to improve cooperation between ministries and divisions in avoiding and fighting cyberattacks; and to rigorously enforce laws against breaking the law online. Secondly, the app developers must develop rules that will safeguard users, improve security, and attract new users. Additionally, it's important to stop the issue of junk SIM and refrain from registering for login accounts using false papers, identification cards, or stolen citizen IDs. Thirdly, sex education in schools is crucial for students' future development and understanding, which helps cultivate their own social knowledge and use the

apps appropriately and safely. And also, this can help them be cautious about disclosing too much confidential information to prevent fraud and unwarranted consequences when using dating apps.

### 6.3. Limitations of the research

The present findings must be interpreted in the context of some limitations. Firstly, the fact that the data collection with a sample size of only 357 participants was only conducted in Ho Chi Minh City made the results less objective and less generalizable. Secondly, the data was based mainly online, so the highest accuracy cannot be guaranteed. Specifically, some respondents have a superficial attitude and are not too interested in this survey, so direct data collection, such as interviewing any student, etc., is necessary to ensure the accuracy of the survey. In addition, some respondents are new users and did not know the application thoroughly. With different purposes and needs, there will be different evaluation decisions. As a result, their assessments can be ambiguous and confusing during survey execution. The major problem happened with the research process when the data was gathered and analyzed using specialist software in order to maximize the value of the data's results. Finally, the main researchers are students, who lack the knowledge and abilities necessary to effectively synthesize, process, and analyze the data. As a result, the data's meaning may not be appropriately and effectively exploited.

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## ENHANCING LOGISTICS OPERATIONS FOR DELIVERING AND RECEIVING GOODS AT CHAN MAY PORT, THUA THIEN HUE PROVINCE, VIET NAM

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**ABSTRACT:** *Chan May Port in Thua Thien Hue province has become one of the key seaports for logistics operations in terms of cargo delivery and reception in the Central region and the whole country. However, the logistics of delivering and receiving goods through the port still contain several disadvantages in terms of the limited organization of implementing the process, and the insufficient direct manpower in complementing, especially in high season. As such this research aims to analyse the status and propose solutions to enhance logistics operations for the delivery and receipt of goods at Chan May Port, Thua Thien Hue Province. In addition to secondary data, primary data was collected through a survey of 90 respondents from 30 companies (including Chan May Port Joint Stock Company and 29 customer companies). Descriptive statistical analysis, comparative analysis, economic accounting methods, frequency analysis, reference methods were used to analyse the data.*

*For future development, the port not only requires modern equipment, strong financial resources, and an abundant and highly skilled workforce with a deep understanding of international laws but also needs to establish a network for cargo delivery and reception within the domestic and global port systems. Building good relationships with domestic and international shipping companies will yield high efficiency and productivity, affirming the reputation of the company and Chan May Port, leading to sustainable development and positioning Chan May Port as a comprehensive and top-tier port in Vietnam.*

**Keywords:** *Logistics operation, delivering and receiving goods, seaport, Chan May*

### 1. INTRODUCTION

Chan May port, Thua Thien Hue province, is Vietnam's premier comprehensive seaport (Ministry of Industry and Trade, 2022). With its favorable maritime location connecting Singapore, the Philippines, and Hong Kong, Chan May Port is situated in the center of Vietnam, between the two major cities of Hue and Da Nang in the Central region. It serves as the nearest gateway to the East Sea and connects Central Vietnam with Northeastern Laos, Northeastern Thailand and Myanmar. In 2019, Chan May Port generated a revenue of 175 billion VND, marking a 17.88% increase compared to the same period in 2018. In 2022, the port's revenue reached 184.2 billion VND, representing 9.24% increase compared to 2021 (Chan May Port Joint Stock Company, 2022).

However, despite having well-established procedures and regulations, there are still several issues that need to be addressed regarding logistics operations at Chan May Port. The delivery and receipt of goods still face challenges in terms of scientific processes, particularly the lack of digitization in these procedures. Direct personnel involvement is required across multiple departments, and the organization and distribution of machinery and equipment have not been optimal. The team responsible for delivery and receipt, as well as cargo control and management, experiences delay in many cases, impacting contract schedules (Chan May Port Joint Stock Company, 2022).

Therefore, it is necessary to explore solutions to address these issues in compliance with regulations, scientific processes, and efficiency. Consequently, the research topic "Logistics Operations for Delivery and

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Receipt of Goods at Chan May Port, Thua Thien Hue Province” holds significant theoretical and practical significance.

The research objective is to systematize theoretical and practical issues related to logistics operations for the delivery and receipt of goods via seaports. The study involves analyzing and evaluating the current state of logistics operations for the delivery and receipt of goods at Chan May Port, Thua Thien Hue Province, during the 2020-2022 period. Additionally, the research aims to propose solutions to enhance logistics operations for the delivery and receipt of goods at Chan May Port, Thua Thien Hue Province in the foreseeable future.

## **2. THEORETICAL BACKGROUND AND METHODS**

The term ‘logistics’ has long been in use worldwide, primarily in the military sector. It encompasses various tasks related to troop movement, force deployment, facility and warehouse design and arrangement, weapons management, and more, all aimed at achieving victory over the enemy. In business operations, logistics refers to minimizing costs, from procuring raw materials to executing production plans and delivery. The goal of logistics in business is to minimize incurred expenses while still achieving the objectives set by the enterprise (Phan Van Hoa, 2014).

According to Article 233 of the 2005 Commercial Law (National Assembly, 2005), logistics services are classified as follows:

Main logistics services: Cargo handling services, including container handling activities; Warehousing and storage services, involving container warehouses and facilities throughout the logistics chain; Agency services for transportation, customs, and cargo handling planning.

Other support services such as handling returned goods, inventory management, expired goods, damaged goods, and redistributing goods; rental and leasing of containers.

The Commercial Law of 2005 defines the concept of goods delivery and receipt logistics as follows: “Goods delivery and receipt are commercial activities in which the service provider receives goods from the sender, organizes transportation, warehousing, storage, paperwork, and other related services to deliver the goods to the recipient as instructed by the shipper, carrier, or other parties involved.”

According to FIATA (International Federation of Freight Forwarders Associations), the concept of freight forwarding services is defined as: “Freight forwarding services encompass any services related to transportation, consolidation, warehousing, handling, packaging, or distributing goods, as well as consulting services related to these services, including customs, finance, insurance, payment, and document collection related to goods” (FIATA, 2019).

Fundamentally, logistics operations for goods delivery and receipt involve a collection of tasks and procedures related to the transportation process, aiming to facilitate the movement of goods from the sender to the recipient.

Based on this, logistics operations for sea freight are carried out through the following seven steps: (1) Vessel chartering; (2) Cargo packaging (for exports); (3) Customs procedures (for exports)/customs declaration (for imports); (4) Cargo inspection; (5) Loading cargo onto the vessel (for exports)/receiving cargo at the port (for imports); (6) Sending documents to relevant parties/delivering goods to customers; (7) Payment and contract settlement.

To achieve the research objectives, secondary data was collected from local agencies, particularly from Chan May Port Joint Stock Company, Lang Co, Thua Thien Hue Province, and published works. Further,

primary data was collected through a survey of 30 companies (including Chan May Port Joint Stock Company and 29 customer companies). In each company we selected three individuals as follows: 01 company leader, 01 head of transportation department, and 01 logistics officer. The total sample size is 90 respondents.

Survey method: For some companies with offices in Hue, the author conducted direct interviews. For other companies, the author conducted interviews via Zalo, Messenger, etc. Evaluation criteria: A Likert scale with five levels of measurement was used, including Level 1 (L1): Strongly Disagree; Level 2 (L2): Disagree; Level 3 (L3): Neutral; Level 4 (L4): Agree; Level 5 (L5): Strongly Agree.

Regarding data analysis, the authors utilize primarily economic research methods such as descriptive statistical analysis, statistical classification analysis, comparative analysis, economic accounting methods, frequency analysis, and reference methods.

### 3. RESULTS AND DISCUSSION

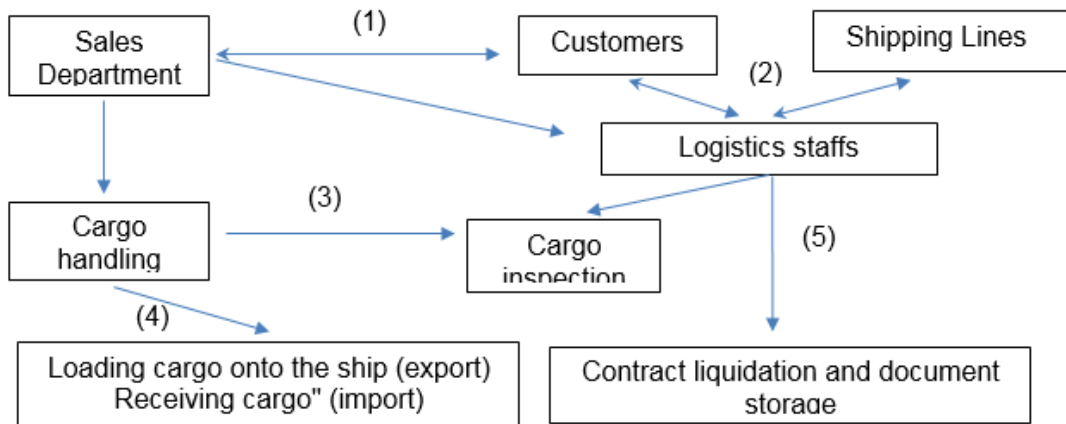
#### 3.1. Process of cargo delivery and receipt for export and import at Chan May Port

The logistics process of cargo delivery and receipt at Chan May Port is carried out as follows:

**Step 1:** Customers send their requests to the company. Customers provide the relevant documents to the delivery and receipt staff regarding the exported or imported goods.

**Step 2:** The delivery and receipt staff communicate with shipping lines, charter vessels, make reservations, coordinate the timing, location, vessel anchoring, and arrangement of cargo handling.

**Step 3:** The delivery and receipt staff proceed to inspect the customs declaration to clear the customs for export or import goods.



**Figure 1: Delivering and receiving goods process for export and import at Chan May Port**

**Step 4:** The stevedoring company carries out tasks such as customs declaration, cargo inspection, loading and unloading goods onto the vessel for exports, and receiving and releasing goods for imports.

**Step 5:** The relevant parties confirm the document files. The Finance and Accounting Department handles payments, contract settlements, and document archiving. The logistics process of cargo delivery and receipt for export and import at Chan May Port concludes.

In general, the cargo delivery and receipt process at Chan May Port is relatively simple, streamlined, and emphasizes the personal responsibility of the executing staff. However, this process has some limitations.

- The shipment of goods to and from the port is usually seasonal, concentrated within specific periods (mainly from January to March and October to December each year), during which there may be insufficient staff to operate or face difficulties in terms of manpower.

- When there is a large number of large vessels arriving at the port, or multiple contracts and a large volume of goods.

- The constantly changing policies and regulations of the government and international community, limited staff capacity, and inadequate conditions and time for updating, particularly in customs procedures, customs clearance, quarantine inspections, and cargo security controls. In the upcoming period, the company needs to adopt reasonable measures to address these issues, ensuring smooth and highly efficient operations.

### 3.2. Current situation of logistics operations in the delivery and receipt goods for export and import at Chan May Port

#### 3.2.1. Implementation status of delivering and receiving goods for export and import through ports

During the period from 2020 to 2022, the global economy experienced a recession due to the negative impact of the Covid-19 pandemic. However, Vietnam has made remarkable achievements and emerged as one of the few economies in Asia that still achieved positive growth. This success can be attributed to the effective implementation of the dual goals of “promoting economic and social development while preventing and controlling Covid-19”.

**Table 1. Implementation status of logistics plans for cargo delivery and receipt, import and export at Chan May Port during the period 2020-2022**

Criteria	Unit	2020		2021		2022		Implementation comparison (%)	
		Implementation	Comparison to the plan (%)	Implementation	Comparison to the plan (%)	Implementation	Comparison to the plan (%)	2021/2020	2022/2021
Cargo throughput	Million tons	2.4	101.0	3.1	106.1	3.5	89.7	129.2	112.9
Total revenue	Billion VND	137.2	104.2	168.6	104.1	184.2	81.8	122.9	109.3
Pre-tax profit	Billion VND	15.9	178.8	2.2	130.9	-9.4	-	13.7	-431.2
Pay taxes	Billion VND	6.6	195.1	0.8	26.7	0.8	153.6	12.1	96.3

Source: Chan May Port Joint Stock Company

At Chan May Port, the company’s leadership has resolutely directed the collective efforts of the workforce to both effectively implement the government and local authorities’ instructions on disease prevention and to ensure efficient production and business operations. Table 1 shows that the company achieved all business targets for the years 2020-2021, exceeding 100% of the plans. However, only in 2022, with the company’s prediction that the Covid-19 pandemic would end and the economy would recover, many planned targets for 2022 were set based on pre-pandemic conditions in 2019.

Nevertheless, the overall economy of our country, particularly the Central region, has not fully recovered. Therefore, the cargo throughput and revenue achieved in 2022 reached 89.7% and 81.8% respectively. However, compared to the performance in 2021, these indicators still showed a significant increase of 12.9% and 9.3% respectively. The pre-tax profit of -9.4 billion Vietnamese đồng in 2022 was due to the company’s expenses for depreciation, principal and interest repayments, particularly when Terminal 2 was put into operation.

### 3.2.2. The situation of logistics operations for delivery, receipt, import, and export of goods at the port

In the period from 2020 to 2022, the volume of goods exported through Chan May Port has seen significant growth over the years. Table 2 shows that the volume of goods exported in 2022 increased by 12.1% compared to 2021, reaching 2.9 million tons.

**Table 2. The situation of Logistics for Delivery, Receipt, Import, and Export of Goods at Chan May Port during the period 2020-2022.**

*Unit: Thousand tons*

Criteria	2020	2021	2022	Comparison (%)	
				2021/2020	2022/2021
Exported goods	1,910.2	2,408.1	2,939.1	126.1	112.1
1. Quantity of goods exported	1,761.4	2,158.8	2,067.5	122.6	95.8
Timber	1,098.8	1,587.6	1,473.9	144.5	92.8
White sand	187.4	126.8	262.2	67.7	206.8
Clinker	405.4	300.1	174.5	74.0	58.1
Titanium	8.3	23.3	27.1	280.7	116.3
Cassava chips	30.2	82.1	57.8	271.9	70.4
Coal	28.8	29.1	30.4	101.0	104.5
Compressed charcoal	0.0	9.9	37.2	0.0	375.8
Asphalt	0.0	0.0	4.3	0.0	-
2. Domestic export volume	148.8	249.4	871.6	167.6	349.5
Imported goods	466.5	711.0	548.0	152.4	77.1
1. Import	86.5	31.1	36.6	36.0	117.7
Asphalt	22.1	12.2	18.9	55.2	154.9
Palm oil	2.5	7.5	5.0	300.0	66.7
Equipment	0.0	0.9	9.8	0.0	1,088.9
Coal	61.9	7.4	0.0	12.0	0.0
Gypsum	0.0	3.1	0.0	0.0	0.0
Titanium	0.0	0.0	2.9	0.0	-
2. Quantity of imported goods	379.9	679.9	511.4	179.0	75.2

*Source: Chan May Port Joint Stock Company*

Despite the ongoing and complex Covid-19 pandemic, thanks to the efforts of the company's leadership, transportation and shipping activities for export goods have increased and recovered. Among the volume of goods exported during the 2020-2022 period, the majority are export goods. In 2022, the volume of exported goods accounted for 70.3% of the total volume of goods exported through Chan May Port, while domestic goods accounted for only 29.7%. This indicates that the focus of goods exported through Chan May Port is primarily on exports, rather than domestic transportation. It also shows that the domestic transportation market remains a significant potential for Chan May Port in the future.

Timber remains the main exported commodity through Chan May Port, accounting for 50.1% of the total volume of exported goods in 2022, followed by white sand at 8.9% and clinker at 5.9%. The remaining are items such as cassava chips, titanium, and others. As for domestic goods, in 2022, white sand accounted for the largest share at 57.9%, followed by clinker at 34.9%. The handling capacity of various goods and the quality of services have been consistently improved over the years, ensuring the reputation of being a deep-water international seaport. The majority of exported goods at Chan May Port are sourced from the local province of Thua Thien Hue. The port has not yet implemented a strategy to attract export goods from other regions within the country, especially the North Central region and neighboring countries such as Laos and Myanmar.

For imported goods, although there has been an increase over the years, the quantity of goods imported through Chan May Port in the three years from 2020 to 2022 is relatively low compared to the export volume. It reached 548 thousand metric tons in 2022, equal to 77.1% in 2021. Among them, the quantity of imported goods is not significant, reaching only 36.6 thousand tons in 2022. The main imported commodities are asphalt, palm oil, primarily intended for the local province of Thua Thien Hue. This indicates that the company has not yet fully tapped into customers from other provinces, especially the North Central region from Thanh Hoa to Quang Tri and neighboring countries like Laos and Myanmar.

### **3.2.3. Assessment of the investigating parties**

Among the 90 surveyed individuals, 63 were male, accounting for 70%, and 27 were female, accounting for 30%. The average age was 36.3 years. In terms of educational qualifications, the majority had a university degree, with 65 individuals, accounting for 72.2%; 14 individuals had a vocational level of education, accounting for 15.6%. The remaining individuals had a college degree (7.8%) or a postgraduate degree (4.4%). With such a sample structure and criteria, the gathered information can be reasonably and accurately used for analysis.

#### **\* Evaluation by investigative subjects on delivery services, contracts, and customs procedures**

The survey results show that there are four observations regarding delivery services, contracts, and logistics processes for goods through the port. The average value of these four observations ranges from 3.66 to 3.96 points, with no observation having an average value above 4.0 points. The highest evaluation is regarding “Chan May Port Joint Stock Company having many channels for promoting and advertising logistics services for goods delivery,” with an average value of 3.96 points and a standard deviation of 0.87. It received 36.7% of opinions at level 4, which is “Agree,” and 31.1% of opinions at level 5, which is “Completely agree.” The lowest evaluation is regarding “The contract for logistics services for goods delivery at the company is well-drafted and reasonable,” with an average value of 3.66 points and a standard deviation of 0.69. It received 53.3% of opinions at the “Agree” level and 7.8% of opinions at the “Completely agree” level.

As for customs procedures for import and export of goods, all four observations have low average values below 3.72 points. The highest observation is “The customs procedures for importing goods are clearly structured, well-connected, and smooth,” with an average value of 3.72 points and a standard deviation of 0.70. It received 13.3% of evaluations at level 5, which is “Completely agree.” Based on practical research, the customs procedures for import and export of goods are carried out by the Customs Department of Chan May Port according to Article 21 of the Customs Law 2018 and Decree No. 08/2015/NĐ-CP dated 21/01/2015 of the Government, which provides detailed regulations and measures for the implementation of customs procedures, inspection, supervision, and control. Implementing these procedures correctly and strictly affects the operation time of many enterprises and the company as a whole. Therefore, many companies evaluate this observation as average and agree, meaning at level 3 and level 4. In the coming period, the company needs better measures to coordinate with the Customs Department of Chan May Port to expedite and timely customs clearance, save time, and reduce costs for businesses, contributing to the development of the local economy.

#### **\* Evaluation by investigative subjects on trust in logistics for goods delivery.**

Regarding the criterion of trust in logistics for goods delivery through Chan May Port, there are six observations with average values ranging from 3.74 to 4.07 points. The highest evaluations are for “The company’s reputation in the market” and “Security measures at the port are ensured,” with average evaluation

values of 4.07 points (standard deviation of 0.85) and 4.02 points (standard deviation of 0.79) respectively. This initially indicates that customer companies have a high level of trust and rate the trustworthiness of the company's logistics for goods delivery through the port highly.

***\* Evaluation by investigative subjects on the ability to respond in logistics for goods delivery***

Regarding the criterion of the ability to respond in logistics for goods delivery through Chan May Port, there are five observations with average evaluation values ranging from 3.73 to 4.03 points. The highest evaluations are for "The company's leadership and employees always listen to customer opinions and make adjustments to serve customers well" and "Employees are always ready to assist customers," with average evaluation values of 4.03 points (standard deviation of 0.84) and 3.87 points (standard deviation of 0.82) respectively. Therefore, we can see that the port's staff is always ready to meet and assist with the requests made by customers.

***\* Evaluation by investigative subjects on the service capacity in logistics for goods delivery***

Regarding the criterion of service capacity in logistics for goods delivery at Chan May Port, there are seven observations with average evaluation values ranging from 3.68 to 3.80 points. The highest evaluations are for "Quick document procedures for delivery and receipt" and "Effective application of information technology systems in goods delivery," with both observations having an average evaluation value of 3.80 points and corresponding standard deviations of 0.84 and 0.81 respectively. Therefore, we can see that the staff at Chan May Port is always striving to equip modern information technology systems to carry out delivery and receipt procedures as quickly as possible in order to provide the best service to customers.

***\* Evaluation by investigative subjects on empathy and tangible facilities***

Regarding the criterion of empathy from the staff at Chan May Port towards customers, there are five observations, and the average evaluation values by the investigative subjects range from 3.73 to 3.90 points. Among them, the observation "The company promptly coordinates with parties for adjustments" received the highest evaluation with an average score of 3.9 points and a standard deviation of 0.78. This indicates that the staff at Chan May Port always strives to understand and empathize with customers.

For the criterion of tangible facilities at Chan May Port, there are five observations, and the average evaluation values by the investigative subjects range from 3.59 to 3.69 points. Among them, the observations "The port's vehicles, machinery, and equipment are good and modern" and "The warehouse and transportation infrastructure meet customers' needs well" received the highest evaluations with an average score of 3.69 points. The standard deviation for both of these observations is 0.70. This shows that Chan May Port has made efforts to provide the best and most modern vehicles, machinery, and infrastructure so that customers can experience the best service possible.

***\* Overall evaluation of logistics operations for cargo handling at Chan May Port***

Finally, there is a general evaluation criterion for logistics operations regarding the delivery and reception of goods at Chan May Port, with four observations. The average evaluation values by the investigative subjects range from 3.76 to 3.87 points. Among them, the observation "Customers will recommend Chan May Port Joint Stock Company to many other clients and partners" received the highest evaluation with an average score of 3.87 points and a standard deviation of 0.60. This shows that through the port's operations, the customers feel satisfied and they want to recommend the port to others.



**Table 3. Overall evaluation of logistics operations for cargo handling at Chan May Port**

Target	Rating levels (%)					Mean value	Standard deviation
	L1	L2	L3	L4	L5		
Logistics operations for goods delivery and reception at Chan May Port meet the needs of customers well.	1.1	0.0	35.6	48.9	14.4	3.76	0.74
Customers are quite satisfied with the logistics services for goods delivery and reception provided by Chan May Port Joint Stock Company.	1.1	1.1	25.6	60.0	12.2	3.81	0.70
Customers always maintain their reputation and sustainable loyalty to Chan May Port Joint Stock Company.	1.1	0.0	27.8	63.3	7.8	3.77	0.64
Customers will recommend Chan May Port Joint Stock Company to many other customers and partners.	1.1	0.0	18.9	71.1	8.9	3.87	0.60

*Source: Survey data from 2022*

Regarding the observation “Logistics operations for cargo delivery and reception at Chan May Port meet customers’ needs,” it has the lowest value in the survey, reaching 3.76 points, with a standard deviation of 0.74. Additionally, 1.1% of the evaluations were at level 1, indicating “Strongly disagree.” This indicates that in recent times, especially during the complex developments of the Covid-19 pandemic, the demand for cargo transportation has increased, but the number of staff available to work directly at the port is limited. As a result, the port’s employees have not been able to perform their tasks well and meet the customers’ needs, especially in terms of timeliness. Therefore, the company needs to implement better measures to address the issue of increasing direct workforce. Additionally, the port’s employees need to make greater efforts to improve the quality of service in the future.

Overall, the logistics operations of cargo delivery and reception through Chan May Port, Thua Thien Hue province, have achieved encouraging results in recent times. The delivery and reception processes have been reasonable, streamlined, and smoothly executed. Despite the significant impact of the Covid-19 pandemic during the period from 2020 to 2022, the company’s leadership has implemented various effective measures, strengthened promotion and business relationships, resulting in a substantial increase in cargo volume through the port over the years. In 2022, there was a 12.9% increase compared to 2021, reaching 3.5 million tons, with a revenue growth of 9.3%, amounting to 184.2 billion VND.

However, there are still some limitations in the logistics operations of cargo delivery and reception at Chan May Port, Thua Thien Hue province. Specifically:

- Lack of specialization for each department: The organizational structure of the company is still simple, and the number of employees is limited.
- The Covid-19 pandemic has created difficulties in implementing the delivery and reception processes. The number of customers has significantly decreased, and transaction costs have increased compared to normal times.
- Insufficient transportation vehicles with low capacity affect the timeliness of cargo delivery and reception.
- The freight charges for cargo delivery and reception are relatively high, resulting in additional costs and the profitability not reaching the optimal results.

#### **4. SOLUTIONS TO IMPROVE LOGISTICS OPERATIONS FOR CARGO DELIVERY AND RECEPTION AT CHAN MAY PORT**

##### **4.1. Market promotion and enhancing competitiveness**

With the goal of developing into a multi-functional port that accommodates bulk cargo ships, container ships, and tourist ships, the company needs to focus on market research and studying competitors to enhance its competitiveness. Combining communication strategies and promotion to attract potential

customers, especially customers from the Central and Central Highlands regions, as well as customers from neighboring countries such as Laos and Myanmar.

Furthermore, it is crucial to strengthen logistics contracts between regions with incoming and outgoing cargo to and from Chan May. The company needs a strategic plan to enhance joint ventures and partnerships to strengthen the logistics system in this area. Promoting forms of investment cooperation or capital contributions from customers based on mutually beneficial cooperation is also important.

Maintaining good relationships with traditional customers is essential. Collaboration and information exchange with relevant agencies and proposing coordination mechanisms to address obstacles are crucial.

Continuing to implement diversification strategies by offering supplementary services and exploring potential services to increase revenue and improve business efficiency for the company.

#### **4.2. Quality solutions for delivery and receipt services**

Enhancing the quality of logistics operations for cargo delivery and reception at the port. Step-by-step improvement of each stage in the process of logistics operations for exporting and importing cargo, ensuring strict, scientific, and highly efficient procedures. The cargo delivery and reception processes at Chan May Port are relatively simple, streamlined, and emphasize the personal responsibility of the staff. However, in some cases, there are limitations to this process, especially when dealing with seasonal shipments, a large number of incoming vessels, multiple contracted companies, or a significant volume of cargo. The changing policies of the government and international regulations, especially customs procedures, clearance, inspections, and cargo security controls, contribute to the decrease in the quality of the company's delivery and reception services. Therefore, in the coming period, the company needs to implement reasonable measures to address these issues, ensuring smooth operations and improving the quality of delivery and reception services. Create favorable conditions for businesses to deliver and receive goods. Take customer requirements as guidance for the company's operations.

Timely resolution of difficulties and challenges faced by business customers, seeking solutions to ensure the implementation of logistics operations for cargo delivery and reception in the shortest possible time, while ensuring cost savings and efficiency.

#### **4.3. Human resource, human resource management and production management solutions**

The company needs to develop a team of staff, especially those directly and indirectly involved in logistics operations for cargo delivery and reception, who possess high professional expertise, a professional work attitude, the ability to work independently and in teams, and are ready to adapt to environmental changes. It is necessary to boldly recruit and allocate young personnel with competence, qualifications, and dedication to the company for key positions. Additionally, the company should research and establish a welfare policy to retain talented individuals while ensuring compliance with state regulations. Maximizing external sources of human resources can help minimize management costs and risks for the company.

It is important to explore solutions to create motivation for workers, enhance job productivity and efficiency, and further implement training policies that provide opportunities for personal development. Organizing training and development programs on operating procedures, container handling equipment, service marketing, port operation management, container cargo, and logistics operations ensures a qualified workforce to fulfill tasks and business plans for 2023 and the years ahead.

Ensuring a proper delivery and reception process, cargo counting, and regularly monitoring the warehouse's condition to promptly address issues and perform repairs. Timely meeting customers'

warehouse rental needs and taking proactive measures in equipment repairs and infrastructure to accelerate production progress.

Frequent maintenance and strict adherence to labor safety conditions, loading and unloading equipment, port exploitation procedures, and the deployment of on-duty personnel during cargo loading and unloading operations to ensure safety.

#### **4.4. Pricing, Fees and Financing Solutions**

Price and fees are important tools in the marketing strategies of all businesses. According to the summary and observations from various research works by multiple authors (Phan Van Hoa, 2014), the period before the 1990s was characterized by the era of products and product quality (the first P - Product in marketing, emphasizing high-quality products) with notable goods from Japan, the United States, and Europe. Since the 1990s, we have entered the era of price (the second P - Price in marketing, emphasizing low product prices), with China's goods standing out, along with the four Asian "dragons" of South Korea, Taiwan, Singapore, and Hong Kong, as well as newly industrialized countries (NICs). Currently, we are in the era of "Price and Fees." The future is predicted to be the era of artificial intelligence products, where products will provide maximum convenience and benefit to users (the third P - Place in marketing), whether through extensive distribution channels (such as online shopping) or direct interaction with users (such as self-driving cars or smart home devices that optimize various tasks for humans).

Based on these observations, in the near future, the company needs to implement attractive pricing and fee policies to increase competitiveness and attract customers, including:

- Researching and implementing various forms of service price and fee reductions.
- Applying price and fee discounts based on customer segments: Regular and large customers should receive preferential pricing and distinct advantages compared to other customers.
- Implementing seasonal price and fee discounts: As the market for cargo delivery and reception through ports is seasonal, appropriate pricing policies should be established for each season.
- The company should review and study cost reduction measures for operations and indirect costs to lower the cost of delivery and reception services.
- In addition to focusing on finding new sources of goods and increasing revenue, the company needs to pay attention to maintaining the effective operation of services and high-profit-margin products.
- Enhancing efficiency in financial management, debt management, expediting payment processes, and implementing effective debt recovery measures. Clear responsibilities and specific accountability should be established for debt management within the company.

#### **4.5. Other solutions**

- Implement effective investment plans and ensure balanced coordination of resources, including physical infrastructure, equipment, and personnel, across services to ensure efficient business operations and reduce financial pressure on the company.
- Continue to strengthen project management to ensure proper implementation of projects, meeting technical and aesthetic standards to reduce initial investment costs. The project's effectiveness should be a top priority.

### **5. CONCLUSION AND RECOMMENDATIONS**

Chan May Port in Thua Thien Hue province has become one of the key seaports for logistics operations in terms of cargo delivery and reception in the Central region and the whole country. The logistics process for import and export goods through the port is executed tightly and clearly, showcasing the operational

capabilities of each department and employee within Chan May Port Joint Stock Company. In the upcoming period, the port not only requires modern equipment, strong financial resources, and an abundant and highly skilled workforce with a deep understanding of international laws but also needs to establish a network for cargo delivery and reception within the domestic and global port systems. Building good relationships with domestic and international shipping companies will yield high efficiency and productivity, affirming the reputation of the company and Chan May Port, leading to sustainable development and positioning Chan May Port as a comprehensive and top-tier port in Vietnam.

**\* Recommendations to the State and the Provincial People's Committee:**

- Train human resources in the logistics industry to quickly meet the labor demand and promote training programs for logistics experts with applied skills and the ability to implement logistics management practices and supply chain management in line with developed industrial nations.

- Invest in the construction and development of infrastructure to facilitate the transportation of goods domestically and internationally, including maritime transportation.

- Improve the legal system for cargo delivery and reception in a comprehensive and consistent manner, aligning with the current situation of import and export cargo within the country and globally.

**\* Recommendations to relevant departments and agencies:**

- Customs authorities need to implement measures to prevent negative occurrences when businesses declare customs procedures, which often result in time-consuming procedures for cargo delivery and reception.

- Customs authorities should explore more advanced customs procedures, especially digitalization of customs procedures, to simplify processes while ensuring proper customs management.

- The Ministry of Industry and Trade needs to ensure unity among relevant agencies, departments, and personnel regarding criteria for determining the origin of goods, avoiding confusion for businesses when receiving different feedback from various departments, units, and officials.

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## FACTORS AFFECTING STUDENTS' DECISION TO CHOOSE THE BUSINESS ADMINISTRATION MAJOR AT UNIVERSITY OF ECONOMICS, HUE UNIVERSITY

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**ABSTRACT:** *This study aims to identify the factors affecting the decision to choose the Business Administration (BA) major at the University of Economics, Hue University. The multiple linear regression analysis conducted on a dataset comprising 259 students from the first to fourth year yielded significant findings, identifying a total of seven affecting factors. The results of the study identified seven factors that influence the decision to choose the BA major at University of Economics – Hue University, including: (1) Reference characteristics; (2) University characteristics; (3) Self-characteristics; (4) Major characteristics; (5) Future career opportunities; (6) Opportunities for further education, research, and development at higher levels; and (7) Admission chances. These seven factors explained 79.6% of the variance in students' decision to choose this major. Based on these findings, the study proposes several managerial implications to enhance the recruitment efforts and attract students in the field of Business Administration at University of economics – Hue University.*

**Keywords:** *major selection decision, Business Administration major, students, University of economics – Hue University.*

### 1. INTRODUCTION

The process of selecting a career path to pursue one's passion after completing secondary education is a matter of great concern for both society and individuals themselves. Making an informed career choice not only helps students set educational goals but also enables them to unleash their potential and become valuable contributors to their families and society. When faced with the decision of choosing a profession and a university, most students experience uncertainty and indecisiveness. During this critical phase, various factors significantly influence and impact students' choices. In Vietnam, the Business Administration field is well-established and offers a wide range of opportunities due to its diversity and market demand. Therefore, educational institutions must implement targeted communication programs to raise awareness about this field and guide students in their career selection.

University of Economics, a member institution of Hue University with an enrollment of nearly 8,000 students, plays a pivotal role in providing a skilled workforce to meet the economic development needs of the region. In recent years, the university has taken proactive measures to enhance the quality of education by updating curriculum and teaching methodologies to align with modern trends. Moreover, significant investments have been made in student recruitment efforts. The Business Administration major, one of the most popular programs at the university, has consistently attracted many applicants with high admission scores. However, there has been a concerning downward trend in the enrollment figures for the Business Administration major, as well as other disciplines, which falls short of the intended targets, despite its status as a flagship program. To address this issue and improve the university's overall appeal, particularly in the Business Administration field, it is crucial to conduct research on the decision-making process of prospective students when selecting both their university and major. This research aims to identify the key factors that significantly influence their decisions, enabling the formulation of effective policies that enhance student attraction and enrollment for the university, with a specific focus on the Business Administration major.

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## 2. THEORETICAL BACKGROUND

### 2.1 Conceptualizing Students’ Decision to Choose a Major

According to Borchert (2002), the decision to choose a major is a process consisting of five main stages: self-awareness of personal needs, seeking information about schools and majors, evaluating, and selecting solutions, making the final decision on the major, and finally, evaluating the outcome of the chosen major. The selection of a major is a deliberative process in which individuals carefully consider and calculate in order to make the optimal final decision. The chosen major should align with the individual’s personal interests and abilities to achieve their future career goals.

Therefore, students choose a major that they perceive as fitting their own personal style, personality, and future career aspirations (Saemann & Crooker, 1999). Students become aware of the economic and social conditions and their own unique characteristics to plan and envision the achievements associated with selecting a specific field of study (Gul, 1986). The majority of students make their decision to choose a major early on, typically during the final two years of secondary education (Hunjra et al., 2010).

### 2.2 Factors Affecting Students’ Decision to Choose a Major

There are various perspectives on the factors affecting students’ choice of majors. Several factors have been extensively discussed in studies, such as: Self-Characteristics, Reference Characteristics, University Characteristics, Future career opportunities, Major Characteristics, Opportunities for further education, research, and development at higher levels, Admission chances.

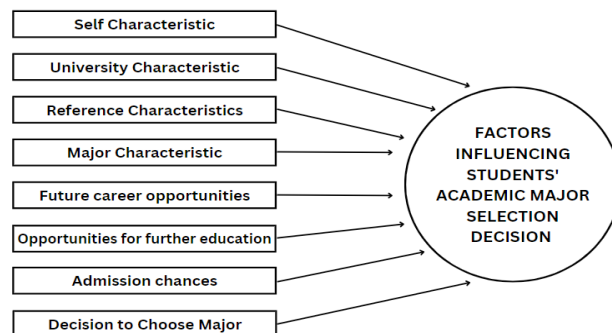
**Table 1. Factors Affecting Students’ Decision to Choose a Major**

<b>Factors Affecting Students’ Decision to Choose a Major</b>	<b>Concept</b>	<b>Author Addressed</b>
<b>Self-Characteristics</b>	Personal characteristics, also referred to as individual traits, encompass the unique personality, qualities, and inner attributes of everyone. They shape an individual’s thoughts, words, and motivations, driving their actions and choices. When selecting a major, individuals may consider factors such as the compatibility with their personal preferences and traits, alignment with their capabilities, and suitability to their economic and social circumstances	DW.Chapman (1981) Borus (1993) Hossler (1984) Gul & Fong (1993) Ruth E.Kallio (1995) Manski & Wise (1983) Le Thyy Van & Cao Hao Thi (2009)
<b>Reference Characteristics</b>	The reference group of characteristics refers to individuals who exert influence on students’ decisions regarding their choice of major. These influential individuals, including parents, siblings, relatives, friends, teachers, and individuals with expertise in the field, hold significant sway over the individual. Before making the crucial decision of selecting a major, individuals often seek opinions and guidance from those they deem relevant and trustworthy, using them as a foundation for their decision-making process.	D.W.Chapman (1981) Hossler và Gallagher (1987) Cabrera & La Nasa (2000) Mario & Helena (2007) Kim et al. (2002) Lowe & Simons (1997) Kniveton (2004) Tran Van Quy & Cao Hao Thi (2007)
<b>University Characteristics</b>	The institutional characteristics of a university refer to its internal attributes and qualities. When choosing a major, students may take into account the specific characteristics of the university, including its geographical location, admission policies, development strategies, reputation and brand, training costs, quality of faculty members, and physical infrastructure. These factors contribute to the decision-making process and influence students in their choice of major	D.W.Chapman (1981) Absher & Crawford (1996) Hossler & Gallagher (1990) Kohn et al. (1976) Ford et al. (1999) Joseph (2000) Vu Thi Hue (2017) Nguyen Minh Ha (2011)

<b>Future career opportunities</b>	Post-graduation expectations encompass the individual desires and aspirations of students upon completing their specialized academic programs at the university, which are influenced by personal characteristics such as family background and living environment. Each individual may have distinct expectations after graduation. However, there are common overarching expectations, including the pursuit of a well-paying job that aligns with their field of expertise, opportunities to work in dynamic environments, prospects for employment in multinational companies, and possibilities for career advancement. These are areas of significant interest for individuals as they transition from their academic journey to the professional world.	S.G.Washburn et al. (2000) Cabera & La Nasa (2000) Sugahara et al. (2008) Tran Van Qui & Cao Hao Thi (2009) Nguyen Minh Ha et al. (2011)
<b>Major Characteristics</b>	The characteristics of an academic discipline pertain to its distinct attributes and offerings. Each field of study presents different courses, study materials, and learning approaches that are tailored to its specific nature. Students opt for a particular major based on the compelling characteristics of the discipline, including its high appeal, availability of extracurricular programs, and a commendable graduation rate.	Malaysia Yusof et al. (2008) Ford et al. (1999) Marvin J.Burns at al. (2006) Gilmour et al. (1981) Carpenter & Fleishman (1987) Uyar et al. (2011) Vu Thi Hue et al. (2017) Nguyen Minh Ha et al. (2011)
<b>Opportunities for further education, research, and development at higher levels</b>	The prospects of further learning, research, and development in higher levels of education (after graduation) have a positive impact on prospective students’ choice of university. Students opt for the Business Administration program due to the opportunities it offers, such as participation in various training programs both domestically and internationally, the potential for higher education continuation, and access to scholarship opportunities.	S.G.Washburn et al. (2000) Cabera & La Nasa (2000) Sugahara et al. (2008) Ha, Xuyen & Tuyet (2011)
<b>Admission chances</b>	The perception of a high likelihood of admission can also influence students’ choice of major. Many students choose a particular field of study because they believe it has low competition rates and a suitable admission cutoff score, thereby increasing their chances of being admitted.	Vu Thi Hue at al. (2017) Nguyen Minh Ha at al. (2011) Ha, Xuyen & Tuyet (2011)

**2.2 Research Model**

Through a comprehensive review of literature and the formulation of hypotheses based on relevant studies, the proposed research presents the following research model. This model draws on several studies, including D.W. Chapman (1981), Cabrera & La Nasa (2000), Kim et al. (2002), and Hà, Xuyên & Tuyết (2011). The proposed research model is as follows:



**Figure 1: Research model of factors influencing students’ decision to choose a major in Business Administration.**

*(Source: Author’s proposal)*

### ***Self-Characteristics***

Chapman's model (1981) suggests that an individual's characteristics play a significant role in their choice of educational institution and major. Gul and Fong's study (1993) found that introverted students are more inclined towards accounting majors due to their preference for independent work environments over group settings. Hossler (1984) argues that when students recognize their aptitude for a specific field of study that aligns with their strengths, they are more likely to select universities offering programs in that field. Manski and Wise (1983) also support the notion that personal factors influence students' decision-making. Additionally, Ruth E. Kallio's research model (1995) highlights the impact of gender on school choice. Building upon these foundations, this study proposes Hypothesis 1.

*Hypothesis 1: "Self-characteristics are positively associated with the decision to choose a Business Administration major among students."*

### ***Reference Characteristics***

During the university selection process, individuals are often strongly influenced by the persuasive arguments and advice provided by their friends and family, as stated by D.W. Chapman (1981). Hossler and Gallagher (1987) further affirm that, apart from parental influence, peers also exert a significant impact on individuals' decisions regarding their choice of university and major. Additionally, Cabrera and La Nasa (2000), Kim and colleagues (2002), Kniveton (2004), and Lowe and Simons (1997) have identified the substantial influence of parental encouragement on individuals' career aspirations. Building upon these findings, this study proposes Hypothesis 2.

*Hypothesis 2: "Reference group characteristics are positively associated with the decision to pursue a Business Administration major among students."*

### ***University Characteristics***

Research conducted by Chapman (1981), Kohn and colleagues (1976), Hossler and Gallagher (1990), and Joseph (2000) suggests that geographical proximity to the university, coupled with affordability, significantly impacts students' decision-making process when choosing their academic environment. Furthermore, Absher and Crawford (1996) emphasize the crucial role played by educational facilities, such as classrooms, laboratories, and libraries, in influencing students' preferences for a particular university. Marvin J. Burns' study (2006) and the work of Hossler and colleagues (1990) indicate that factors such as the university's website development, admissions counseling, strategic advertising through various media channels, and engagement in extracurricular activities or scholarship programs all influence students' decisions when selecting a university and major. Similarly, the research by M.J. Burns and colleagues (2006) highlights the significance of factors such as institutional reputation, prestigious faculty, and renowned teaching staff in influencing undergraduate students' choice of major. Based on these premises, this study proposes Hypothesis 3.

*Hypothesis 3: "University characteristics are positively associated with the decision to pursue a Business Administration major among students."*

### ***Major Characteristics***

Studies conducted by Yusof and colleagues (2008) in Selangor, Malaysia, Gilmour and colleagues (1981), Carpenter and Fleishman (1987), and Uyar and colleagues (2011) have all concluded that the relevance of a major's curriculum to societal needs significantly influences students' decisions when selecting a university and major. Moreover, Ford and colleagues (1999) have observed that factors such as the breadth of the study program, program flexibility, the potential for significant variations, and a wide



range of degree options are crucial considerations for students when choosing a major that aligns with their interests and aspirations. M.J. Burns further adds that the attractiveness of a particular major also plays a role in students' university choices. Based on these findings, this study proposes Hypothesis 4.

*Hypothesis 4: "Major characteristics are positively associated with the decision to pursue a Business Administration major among students."*

#### ***Future career opportunities***

According to Sevier (1998), Cabera and La Nasa (2000), and Sugahara et al. (2008), students are often attracted to the career opportunities available after graduation. Paulsen (1990) notes that students tend to select universities based on the job prospects for college graduates. They are highly concerned about employment opportunities and are influenced by the achievements of alumni in society (Sevier, 1997). Additionally, Cabera and La Nasa (2000) highlight that besides academic aspirations, future career prospects also play a significant role in individual university choices. Building upon these foundations, this study proposes Hypothesis 5.

*Hypothesis 5: "Future career prospects are positively associated with the decision to pursue a Business Administration major among students."*

#### ***Opportunities for further education, research, and development at higher levels***

Opportunities for higher education, research, and development at advanced levels in the future (after completing their chosen major) have a positive impact on prospective students' university choices (Ming, 2010; Trần Văn Quý and Cao Hào Thi, 2009; Vũ Thị Huệ, Lê Đình Hải, and Nguyễn Văn Phú, 2017). According to Paulsen (1990), students often choose universities based on the opportunities for advanced learning, research, and development available to college graduates. Studies by Nguyễn Thị Lan Hương (2012) and Trần Minh Đức (2015) also indicate that opportunities for bridging programs influence students' choice of majors. Based on the aforementioned research findings, the author formulates Hypothesis 6 for this study.

*Hypothesis 6: "Opportunities for higher education, research, and development at advanced levels are positively associated with the decision to pursue a Business Administration major among students."*

#### ***Admission chances***

Saemann and Crooker (1999) conducted a study on factors influencing students' choice of majors, including students' perception of a higher probability of admission to accounting majors in the United States. Worthington and Higgs (2003) and Worthington and Higgs (2004) measured students' perceived admissions probability at the Queensland University of Technology in Australia when selecting majors in finance and economics. In Vietnam, Vũ Thị Huệ and colleagues (2017), Nguyễn Minh Hà and colleagues (2011), and Hà, Xuyên, and Tuyết (2011) have also highlighted admissions probability as a factor impacting students' decisions in choosing majors. Based on these research findings, the author formulates Hypothesis 7 for this study.

*Hypothesis 7: "Admissions probability is positively associated with the decision to pursue a Business Administration major among students."*

### **3. METHODOLOGY**

#### **3.1 Secondary data collection**

The research method used is literature review, which involves collecting and analyzing relevant documents and data such as the curriculum framework, learning outcomes standards of Business Administration majors; the number of students enrolled in Business Administration each year, and the number of students currently being trained in Business Administration at University of economics – Hue University. Additionally, the analysis includes documents such as research topics, projects, articles, and conference papers related to the

motivations for choosing majors that have been conducted recently. Furthermore, a synthesis of research documents is conducted to establish the theoretical foundation of the study.

### **3.2. Primary data collection**

The research utilizes both qualitative and quantitative research methods to serve the research process. Qualitative research: It involves gathering opinions from individuals to construct a measurement scale and assist in qualitative analysis related to the research objectives. Quantitative research: It is carried out based on information collected from survey questionnaires distributed to Business Administration students currently studying at the University. The objective is to address the research goals.

### **3.3. Data Collection Method**

For the exploratory factor analysis (EFA), the expected sample size was determined based on the study by Hair, Anderson, Tatham, and Black (1998) as a reference. According to their research, the minimum sample size should be at least 5 times the total number of observed variables. This sample size is appropriate for studies utilizing factor analysis (Comrey, 1973; Roger, 2006). The formula used is  $n=5*m$ , where  $m$  represents the number of questions in the questionnaire. In this study, there are a total of 36 variables, so the minimum required sample size would be  $36 * 5 = 180$  samples. However, the author chose a sample size of  $n = 270$  to minimize errors and achieve better effectiveness in the data analysis process. The author opted for a non-random sampling method based on quotas. The quota criterion was determined by the proportion of students enrolled in the Business Administration major at the University. In the survey sample structure, a total of 259 students currently studying at the University of Economics, Hue participated. Specifically, there were 45 fourth-year students (17.37% of the total), 83 third-year students (32.05% of the total), 74 second-year students (28.57% of the total), and 57 first-year students (22.01% of the total).

### **3.4. Data analyses:**

The data will be analyzed using the SPSS software, employing several statistical tests and tools for examination, including: Cronbach's Alpha coefficient, Exploratory Factor Analysis (EFA), linear multiple regression model

## **4. STUDY RESULTS**

### **4.1. Profiles of the respondents**

The survey sample consisted of 259 students currently studying at University of Economics – Hue University. Regarding academic cohorts, the distribution was as follows: 45 students from the 53rd cohort (17.37%), 83 students from the 54th cohort (32.05%), 74 students from the 55th cohort (28.57%), and 57 students from the 56th cohort (22.01%). In terms of gender, there were 182 female students (70.2%) and 77 male students (29.73%).

### **4.2. Exploratory Factor Analysis (EFA)**

The reliability of the measurement scale used to assess the factors influencing the decision to choose the Business Administration major among students at the University of Economics - Hue University was examined. With a total of 36 variables, the Cronbach's Alpha coefficient was calculated to assess the scale's reliability. From the results in the evaluation of Cronbach's Alpha results for the scales, we can see that the Cronbach's Alpha values for the scales are as follows:

Self-characteristics: 0.877

Reference characteristics: 0.894

University characteristics: 0.847

Future career opportunities: 0.936

Field of study characteristics: 0.840

Opportunities for higher education, research, and development: 0.898

Admission probability: 0.882

Major selection decision: 0.882

Moreover, the item-total correlations for all observed variables are  $> 0.3$ . Therefore, the scales used in the model are reliable. Hence, all variables will be included for further exploratory factor analysis (EFA) analysis.

Perform an exploratory factor analysis on the constructed variable groups to identify the independent factors.

**Table 2. Results of KMO and Bartlett's test.**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.828
(Sig) Bartlett's Test of Sphericity	0.000

(Source: Data processing 2023)

The KMO coefficient is 0.828 ( $> 0.5$ ), and the sig value is  $0.000 < 0.05$ , indicating that the hypothesis of correlation among observed variables in the overall population is appropriate, and EFA factor analysis is suitable. The factor extraction results using the specified number of factors are 7. These seven factors explain 71.8% of the variance in the data.

**Table 3. Factor rotation matrix of the independent variables**

Observed Variable	Factor Loading Coefficient						
	1	2	3	4	5	6	7
The high likelihood of finding a suitable job in the field after graduation.	0.930						
The opportunity to work in various types of jobs.	0.877						
The opportunity to work for foreign companies and have high career advancement prospects.	0.869						
The potential to secure high-income employment opportunities.	0.868						
The opportunity to work in a dynamic environment.	0.866						
The reputation and brand of the university.		0.824					
The attractive scholarship and policies offered by the university.		0.752					
The modern and well-equipped training facilities.		0.698					
The convenient location of the university.		0.680					
The excellent admissions process at the university.		0.677					
The affordability of tuition fees at the university.		0.659					
The quality of the faculty teachers		0.658					
Wide access to postgraduate scholarships in the field.			0.971				
Diverse scientific research fields.			0.932				
Diverse training programs, both domestic and international.			0.828				
Higher education specialization opportunities.			0.798				
Being compatible with one's personality traits.				0.872			
Being compatible with one's economic and social conditions.				0.826			
Being compatible with one's research and learning abilities.				0.806			
Being compatible with one's personal preferences.				0.784			
The large annual intake of students.					0.891		
The opportunity to choose suitable training programs.					0.878		
The suitable competition rate for admission.					0.877		
The appropriate admission cutoff score.					0.777		
The advice of teachers.						0.812	

The influence of current students studying at the university.						0.790	
The opinions of friends.						0.770	
Family orientation.						0.752	
Major has highly appealing characteristics							0.886
Major has high graduation rate.							0.814
The opportunities it provides for students to engage in various extracurricular activities, internships, and practical experiences that are beneficial.							0.811
The high demand for skilled professionals in the field.							0.702
Eigenvalue	4.050	3.816	3.215	3.155	3.095	2.877	2.782
Percentage of explained variance	12.657	11.925	10.047	9.859	9.672	8.990	8.694
Cumulative percentage of explained variance	12.657	24.581	34.581	44.488	54.160	63.149	71.844

(Source: Data processing 2023)

Ti Furthermore, we will assess the appropriateness of the factor analysis with respect to the variables associated with the dependent factors.

**Table 4. Suitability test of factor analysis with variables pertaining to the dependent factors.**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.703
(Sig) Bartlett's Test of Sphericity	0.000

(Source: Data processing 2023)

The factor analysis yielded a Sig value of 0.000 for the Bartlett's test, indicating that the null hypothesis (H0) is rejected. The KMO value, which assesses the suitability of the factor analysis, is 0.703 (between 0.5 and 1). This indicates that the dataset used for the exploratory factor analysis is highly appropriate.

**Table 5. Results of factor analysis for dependent variables**

Observed Variable	Factor Loading Coefficient
I have carefully thought and researched before making the decision to choose the International Business major.	0.962
I am satisfied with my decision to choose the International Business major.	0.841
I hold a high opinion of the International Business major that I am currently studying.	0.822
The decision to choose the International Business major is considered appropriate.	0.812

(Source: Data processing 2023)

### 4.3. Results of linear multiple regression model

The general research equation for multiple linear regression is constructed as follows:

$$QD = \beta_0 + \beta_1N_1 + \beta_2N_2 + \beta_3N_3 + \beta_4N_4 + \beta_5N_5 + \beta_6N_6 + \beta_7*N_7 + e$$

- Dependent variable: QD (Decision to choose the Business Administration major)
- Independent variables: N1 (Self-characteristics), N2 (Reference characteristics), N3 (University characteristics), N4 (Future career opportunities), N5 (Field of study characteristics), N6 (Opportunities for higher education, research, and development), N7 (Admission probability).
- e represents the standard error.

**Table 6. Statistical measures of model fit**

Rsquare change	Adjusted R Square	F Change	Sig. F Change	Durbin Watson
0.801	0.796	144.565	0.000	1.998

(Source: Data processing 2023)

The Durbin-Watson statistic (d) of 1.630 indicates that the model does not violate the assumption of autocorrelation. The Variance Inflation Factor (VIF) for each predictor variable is less than 2, indicating that the regression model does not violate the assumption of multicollinearity.

Model fit assessment:

To evaluate the overall fit of the model, we consider the F-value. The F-value is 144.565 with a significance level of 0.000, which is less than 0.050. Therefore, the regression model is appropriate and can be used.

The adjusted R-squared value of 0.796 indicates that 79.6% of the variation in the dependent variable is explained by the seven independent variables.

The regression results for factors influencing the decision to choose the International Business major are as follows:

**Table 7. Results of multiple linear regression using the Enter method**

Model	Standardized Coefficients	t	Sig
(Constant)		0.000	1.000
Future career opportunities	0.209	7.428	0.000
University characteristics	0.457	16.246	0.000
Opportunities for further education	0.139	4.922	0.000
Self characteristics	0.315	11.205	0.000
Admission chances	0.121	4.297	0.000
Reference characteristics	0.591	21.016	0.000
Major characteristic	0.256	9.107	0.000

(Source: Data processing 2023)

The results of the significance tests show that all the Sig values are < 0.05, indicating that all the variables are significant in the model.

Interpretation of regression coefficients in the model:

The multiple linear regression equation can be written as follows:

Student's Decision to Choose Administration Major = 0.591 \* Reference Characteristics + 0.457 \* University Characteristics + 0.315 \* Self Characteristics + 0.256 \* Major Characteristics + 0.209 \* Future Career Opportunities + 0.139 \* Opportunities for Higher Education, Research, and Development + 0.121 \* Admission Chances

From this estimated model, we can see that the variables that have an impact on the decision to choose the Administration major for students are ranked in descending order as follows: (1) Reference Characteristics, (2) University Characteristics, (3) Personal Characteristics, (4) Major Characteristics, (5) Future Career Opportunities, (6) Opportunities for Higher Education, Research, and Development, and (7) Admission Chances.

#### 4. RECOMMENDATIONS

The research results demonstrate that the factor "Reference Characteristics" has the strongest influence on the decision to choose the Business Administration major among students at the Hue University of Economics. In other words, social relationships (family, friends, seniors, etc.) have a significant impact on the decision to choose the Business Administration major among students at the Hue University of Economics. Therefore, influencing these stakeholders to create positive perceptions about the university among high school students will have a significant impact and contribute to increasing the number of high school students intending to choose the Business Administration major at the university. The university needs to build its image among current students by establishing and managing a friendly and optimal learning environment. All departments and individuals in the university should consider students as customers and treat them fairly, friendly, and enthusiastically, providing support to the best of their abilities, so that students have a favorable and positive perception of the university and the faculty. Additionally, it is

important to enhance community engagement activities, student initiatives, and support programs that help others and contribute to the community.

The research findings indicate several factors that influence students' decision to choose the Business Administration major. Firstly, the factor with the strongest impact is "Reference Characteristics," suggesting that social relationships (such as family, friends, and previous students) significantly influence students' decisions. Therefore, it is crucial for the university to actively engage with these stakeholders and create positive perceptions of the institution among high school students. Building a friendly and optimal learning environment, where all faculty and staff treat students as customers with fairness, friendliness, and enthusiasm, is essential. Additionally, enhancing community engagement activities and student initiatives that contribute to society can further attract prospective students.

The second influential factor is the "School Characteristics," encompassing elements like infrastructure, faculty quality, tuition costs, scholarship programs, and admission counseling policies. This highlights the importance of the university's reputation and its admission counseling efforts in students' decision-making. The Hue University of Economics should focus on strengthening its admission counseling activities by establishing regular and close connections with high school students. This would facilitate the introduction and promotion of the university's image and the Business Administration program.

The third factor affecting students' decision is "Personal Characteristics." Students choose the Business Administration major based on its compatibility with their interests, personality traits, and learning abilities. This demonstrates that students carefully evaluate their own attributes before making a decision. When promoting the Business Administration major, the university should clearly outline which personal characteristics are suitable for the field on its website. Furthermore, in admission counseling programs, it is important to provide guidance on which personal characteristics align with specific majors. This would enable students to make well-informed decisions and consider their choices more thoughtfully.

Finally, the "Admission Probability," including entrance exam scores, competition rates, and the number of available slots, influences students' choices. The results indicate that the easier it is to gain admission to the Business Administration major, the more students are inclined to choose it. Consequently, the university should establish annual admission cutoff scores to increase the options available to students and to build a strong reputation for the major.

## **5. CONCLUSION**

This study focused on analyzing the factors influencing students' decision to choose the Business Administration major at Hue University of Economics. The results have constructed a predictive model for the impact of these factors on the decision to choose Business Administration, which shows a positive relationship (with a standardized coefficient of 0.769). Therefore, the article suggests that in order to improve the effectiveness of the admission process, Hue University of Economics should focus on building a long-standing and reputable image of the institution and enhance communication efforts through various media channels to attract students. However, this study still has some limitations. It does not clarify the differences in evaluation among students based on demographic characteristics, educational forms (regular, high-quality programs), and academic performance. The sample size of the study was 259, which may be limited compared to the total number of students enrolled in the Business Administration program at the university. These limitations provide suggestions for future researchers to conduct further studies and investigations.

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## IMPACT OF TIKTOK SOCIAL MEDIA MARKETING ON DESTINATION DECISION OF TOURISTS

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*ABSTRACT: Short-form video social networks Tiktok has been adopted to promote products and services, especially in tourism industry. This research investigates the impact of social media marketing on the destination decision of tourists to Hue city. Results from surveying 186 tourists to Hue city show that Electronic word of mouth, Entertainment, and Customization have positive impacts on tourists' destination decision. Two factors Interactivity and Trendiness do not have significant influence on destination decision. This research is helpful for tourism businesses and destination marketing organizations to better promote tourism destination images.*

*Keyword: Social media marketing; Tiktok; destination decision; Hue; tourist.*

### 1. INTRODUCTION

In an era where the internet is developing at an explosive speed, the application of communication platforms in tourism promotion has become indispensable. Social media are applications or programs built on the Internet, allowing users to create and share information, ideas, career interests, and more through technological devices and computer networks (Jonathan A. Obar, 2015).

Hue city has been and is about to bring many cultural events but has not been widely promoted to tourists on social networking platforms. (At the same time, this is one of the oldest places to store the quintessence of traditional traditional culture in our country, the historical and cultural value that Hue brings is extremely high and needs to rise to make it a scenic spot worth visiting. According to statistics of the Department of Tourism of Thua Thien Hue province, the total number of tourists to Hue in 2022 is 2.05 million, an increase of 296% compared to 2021. In December 2022, Hue attracted 196.5 thousand tourists, an increase of 957%; in which, international visitors reached 63.5 thousand tourists; staying guests is estimated at 140.5 thousand tourists; revenue in the month is 437 billion Vietnam dong (ThuaThienHueOnline Article, 2022). In addition, continue to implement solutions to promote the development of the tourism industry, especially digital technology solutions, communication strategies to promote tourism. Implement tourism stimulus programs. Connecting major travel agencies to launch new tour programs to the Central region with the main destination of Thua Thien Hue. Invest in developing a system of commercial centers, supermarkets, high-class shopping centers, multi-functional service areas... Thus , it can be seen that the communication and promotion of Hue tourism is one of the prominent factors affecting tourism demand as well as the development of this industry.

Tiktok is a social network that was released in 2017 and widely attracts consumers' attention. It has vertical interface, showing short video and very potential in the field of entertainment. Vietnam ranks 6th in the top 10 countries with the largest number of TikTok users in the world, with about 49.9 million users. According to Data Reportal data, as of February 2023, there were about 77.93 million Internet users in Vietnam. Thus, more than 64% of Internet users in Vietnam are using TikTok. (P.L, 2023).

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TikTok has had a profound impact on the world, bringing about significant changes in various aspects of life and culture. It has become one of the most popular social media platforms globally, revolutionizing the way we create and share short videos. With billions of users, TikTok has fostered a diverse online community, connecting people across nations.

One of the notable influences of TikTok is in the realm of music and culture. It has emerged as a crucial platform for discovering new music, associating songs with unique challenges and trends. Many songs have gained immense popularity and climbed the charts through TikTok's viral spread, transforming how we approach and consume music.

Moreover, TikTok has played a pivotal role in shaping Internet culture. It has birthed distinct trends and challenges, influencing the broader landscape of online culture. Dance routines, comedic skits, and performances have become integral components of the digital culture, with TikTok users rapidly ascending to social media stardom in remarkably short periods.

The platform has also brought about a paradigm shift in marketing and advertising. Due to its massive user base, numerous brands and advertisers have leveraged TikTok as a channel to reach potential customers. Short advertising videos on TikTok have proven to be an effective means of promoting products and services.

Furthermore, TikTok has had a transformative impact on various creative industries. It has created new opportunities for artists, musicians, actors, and other creative professionals. Many young talents have risen to stardom through TikTok, garnering attention from traditional entertainment industries.

In summary, TikTok has fundamentally changed how we approach media, music, Internet culture, and marketing. It has fostered global connectivity and opened up new avenues for creativity and communication in the modern world.

Hue tourism is a destination with potential but has not been strongly exploited on the platform TikTok, an increasingly popular social network. With Hue tourism returning from a hiatus, now is a crucial time to promote and capitalize on the platform's potential. This study was conducted with the aim of analyzing the impact of TikTok social media marketing on the destination decision to Hue. This study hopes to provide managerial implications to help Hue tourism businesses and organizations have a better marketing strategy on Tiktok social network, helping to improve their decision to choose Hue tourism destinations.

## **2. LITERATURE REVIEW**

### **2.1. Tiktok Social Media marketing**

Social media are applications or programs built on the Internet to facilitate the creation or sharing of information, ideas, career interests, and other content over the Internet through devices, technology and computer networks. (Jonathan A. Obar, 2011) (Jonathan A. Obar, 2015). Users typically access social media services through desktop and laptop web applications or download services that provide social media functionality for mobile devices. When users participate in these electronic services, they create highly interactive platforms through which individuals, communities and organizations can share, co-create, and discuss.

Tiktok is a Chinese social media and music video platform (LEE, 2017) was launched in 2017 for markets outside of China, including Vietnam. Tiktok use to create short music, lip sync, dance, comedy and talent videos from 3 seconds to 10 minutes (2018) (2019) and short playback videos from 3 seconds to 60 seconds. (Schwedel, 2018) This application has a vast catalog of sound effects, music tracks and filters to enhance videos and make them more attractive.

Social media marketing is a form of marketing on the Internet through the use of social media channels for the purpose of branding and promoting products or services. Social media marketing is part of digital marketing - a combination of marketing activities (2018). With the strong connectivity of social media channels, where different groups of customers come together to exchange, share, interact, exchange, discuss content, images, etc. The implementation of marketing through these channels is gradually becoming a popular and developed form in the current digital era. When using social media marketing, companies can allow customers and viewers to post user-generated content, also known as “earned media,” instead of using newspapers. advertisements prepared by marketing staff. )

Social media marketing can be impacted by elements including entertainment, trends, engagement, customization, and electronic word of mouth (EWOM). (Mileva & Fauzi DH, 2018) (Cheung M. L., 2019).

**Entertainment** is the ability of advertising to satisfy the viewer’s desire for entertainment, aesthetic pleasure, and emotional release (Genadi, 2020). Through entertainment, brands can build and reinforce a consumer’s sense of closeness to convince them to make a purchase. (Dessart, 2015)

**Interactions** mean that users can provide and receive information in both ways. Posting information that aligns with the goals of a target social media user can foster discussion and improve the relationship between consumers and brands. (Cheung P. &., 2020)

**Trending** means that the marketing channel can provide the latest news and hot topics. Consumers will feel motivated to learn about brand trends Encourage them to keep up with the latest brand developments on social media platforms by searching for trends related to ant awake (Gallaughner & Ransbotham, 2010). Trending information can help capture consumer attention, evoke positive consumer emotions, and drive loyalty intent. (Liu, 2021).

**Customization** is a marketing and messaging service that delights consumers, makes the service customizable, and makes it easy to find information, in order to create value for certain consumers. (Cheung P. &., 2020)

**Electronic word of mouth** is intended for communication made by potential users or those already using a brand or product using social media. EWOM evokes positive emotions in consumers and promotes loyalty intention. EWOM will see the extent to which consumers disseminate and upload information on social media platforms. This is done to communicate about the brand by uploading content to their blog and sharing opinions with others (Cheung P. &., 2020).

## 2.2. Destination decision

### 2.2.1. Tourist destinations

(Gartrell, 1994) definition: “Destinations are geographic areas that have the attributes, features, support and services to attract potential consumers.” In the strategic vision, (Buhalis, 2000) Destination is a mixture of products and services that leave experiences for users. (Stephen J. Page, 2006) Definition: “Destination is a mixture of packaged product and service characteristics such as accessibility, safety, convenience, activities and support services”. As such, the destination must have a certain scope of providing necessary facilities and services to visitors .

Tourist destination is one of the most used concepts in the field of tourism. According to (Cooper, 1998) “A tourist destination is a place where the construction of facilities and services is concentrated to meet the needs of tourists”. (Stephen J. Page, 2006) defines “a tourist destination as a mixture of prepackaged product features, services, accessibility, attraction, amenities, activities and support services”. Rubies defines a destination as a geographical area in which a group of tourist resources and attractive factors are located. The infrastructure, equipment, service providers, other support areas and management organizations with which they interact and coordinate activities to provide visitors with the experiences they expect at the

destination which they choose”. The World Tourism Organization has defined a tourist destination as “the geographical space where tourists stay for at least one night, including tourism products, services provided, Tourism resources attract visitors, have administrative boundaries to manage and have an image identity to determine competitiveness in the market. “ (Nguyễn Thị Lê Hương, 2022) ((UNWTO), 2019)

### **2.2.2. Destination decision process**

Destination decision is the process of selecting tourists from search results and perceiving destination attributes provided by optimal stimuli. (Iso-Ahola, 1980). Destination decision is a process by which potential tourists choose a destination from a set of destinations for the purpose of satisfying their trip-related needs. (Hwang GW, 2006), (Lewis, 2010) The process of choosing a tourist destination consists of five steps, including:

- Identify needs;
- Formulating goals and objectives;
- Establish a set of destination alternatives;
- Seek information on the characteristics of proposed alternative destinations;
- Evaluation and selection of destinations;

### **2.2.3. Destination decision**

Destination decision is the decision to choose a tourist destination is the stage of selecting a tourist destination from a set of destinations that meet the needs of tourists (Um S. a., 1990). According to this author, the decision to choose a tourist destination is the second step in the tourist destination selection process (with the first step being the perception of a suitable set of destinations for the tourist’s needs).

According to (Hwang GW, 2006), destination decision is the decision to choose a tourist destination is the stage in which the tourist chooses a destination from the set of available alternative destinations studied in the previous stages, and becomes a real consumer in the future. tourism sector.

## **2.3. Relationship between social media marketing and destination decision**

Woodside and Lysonski (1989) researched and developed a model of the tourist destination selection process based on the research results that are cognitive and psychological behaviors influenced by tourism marketing activities and tourists. . The authors have tested the model and drawn the conclusion that a product or service is considered by customers for a certain period of time before making a final decision, which is the result of the perception process. scores on attractions, references, comparison with other destinations, intention to visit and destination choice decisions on the basis of the impact of favorable or unfavorable conditions and circumstances. This result is influenced by advertising and communication activities. The marketing factor has a strong impact on tourists’ perception when they go through the stage of finding information about the destination when the need and desire to travel arises. This information can positively or negatively affect the perception of the image of a destination that arises in their mind. Based on this model, marketers can assess the competitiveness of a destination and understand why tourists choose that destination over another. a destination comes to their mind. Based on this model, marketers can assess the competitiveness of a destination and understand why tourists choose that destination over another.

Um and Crompton (1991) applied Chapin’s theory (1974) about two groups of factors affecting tourist destination choice by considering the role of attributes as well as stages in the selection process. destination selection, including awareness, knowledge, commitment, and final destination selection. The concepts mentioned in the model are external factors, internal factors and cognitive components. Specifically:

External factors are considered as a combination of social interactions and marketing communication activities for potential visitors. The internal factors arising from the psycho-social factors of tourists include the personality characteristics of each individual, their motivation for tourism or travel motivation, and values. and attitudes of tourists. Based on the research results, (Um S. &, 1991) created a 5-stage destination choice decision-making model in which the marketing element is added and reused again. Specifically as follows: Visitors will form beliefs about the destination or feel about the destination through the information about the destination that they have access to; tourists should also consider psychological and social constraints when choosing a destination; how cognitive processes are affected by destination perceptions; The formation of trust about the destination also takes place through the information that tourists have about the destination; Select a specific destination from visual recall of that destination.

Through the above two studies, it is shown that the social media platform has a significant impact on the formation of demand and perception of the place, thereby serving as a basis for the decision-making of tourists to choose a destination to visit. tourism. Thus, in the era of the internet growing at an explosive rate like today, the application of communication platforms in tourism promotion has become indispensable.

#### 2.4. Proposed research model

From the theoretical basis of social media, destination choice decision and the relationship between social media and tourist’s destination choice decision, in this study, the authors approach geographical research. A tourist destination is a specific geographical area: Hue city, referred to as Hue tourist destination for short, consists of a collection of integrated tourism products and services to provide visitors with comfortable travel experiences. and memorable.

From the model of Tiktok social media factors that affect consumers’ brand interactions (Santi Rimadias, 2020), the authors selectively inherit the elements suitable for Hue tourist destinations, and at the same time show the benefits of social media. as well as the unique features that the destination wants to offer to visitors in order to stimulate their perception. From there, the study proposes the following research models:

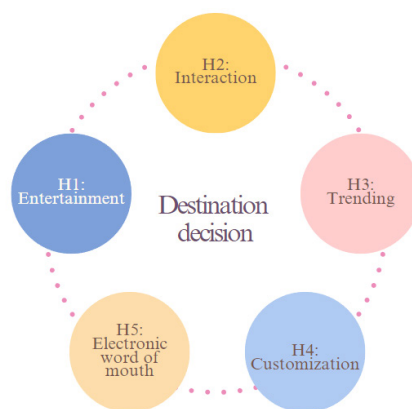


Figure 5 . Proposed research models

### 3. METHOD

#### 3.1. Data collection method

The research focuses mainly on survey respondents belonging to Generation Z (born in 1995 to 2005, ie 18-29 years old). The reason for choosing this age is the age when tourism is booming not only in the world but also in Vietnam. According to the United Nations Population Fund, Vietnam is in the middle of a golden age, with young people (between 15 and 35 years old) accounting for over 30% of the total

population, accounting for the largest proportion (Tran, 2021). Many reports and data from around the world (Dang, 2022) consider young people and young people to be the generation with the highest tourism potential because they love to go out and explore and are willing to spend “a lot of money” on experiences.

Because the survey subjects are tourists coming to Hue, distributed over a large area, the convenient sampling method is suitable for the survey and research process. Research and conduct surveys at popular tourist attractions, such as the Citadel in the period from July 2022 to May 2023. Because time and resources are limited, the questionnaire was collected through a survey of 269 visitors, including both men and women corresponding to different ages from 15-59 years old, with different cultural features between regions of tourists and made in the province of Thua Thien Hue - the destination of tourists.. In which, the survey results obtained have about 186 valid surveys (18 – 29), suitable for the research object proposed by the group for data analysis. Tourists are selected at Hue tourist sites and are accepted to survey if they use Tiktok social network, otherwise will be excluded. The questionnaire was collected from related studies with previous research basis and edited to fit the author’s research.

### 3.2. Data analysing method

This research uses quantitative analysis methods such as Cronbach’s alpha coefficient, factor analysis and regression analysis. Cronbach’s alpha coefficient method is used to evaluate the reliability of the scale. The scale has acceptable reliability when this coefficient is in the range from 0.6 to 0.8. Factor analysis technique is used to evaluate the validity of the scale, thereby adjusting the research model and research hypothesis. According to Hair et al. (2006), the KMO coefficient (Kaiser-Meyer-Olkin) used to consider the suitability of factor analysis must be in the range [0.5-1] and the Bartlett test is statistically significant. millet (Sig. < 0.05). The scales used for factor analysis are Likert scales with 5 levels from 1 strongly disagree to 5 strongly agree used in this study.

### 3.3. Measurement scale

The authors synthesize factors and attributes affecting the choice of tourist destinations from the scale of Santi Rimadias (2020) , and based on the characteristics of communication on Tiktok social network and Hue tourist destination to supplement or remove those attributes deemed appropriate or inappropriate for the study destination. From the combined results, the study collects comments from experts in the field of communication and tourism as a basis for designing the survey questionnaire.

From the proposed research scale, the designed questionnaire consists of three Part: *first* , general information of visitors (gender, age, income , place of residence, number of visits to Hue, time to use Tiktok in 1 day, select and name travel channel) Hue on Tiktok, full names and phone numbers of survey participants) ; *second* , guest reviews of 20 The criterion belongs to 5 factors to measure and evaluate marketing activities about Hue tourism on Tiktok social network.

The 7-level Likert scale is used, which evaluates the factors of social media on Tiktok and decides to choose Hue tourism , showing: *1- completely disagree* to *7 - completely agree* .

## 4. RESEARCH RESULTS

### 4.1. Sample characteristics

Table 1 presents the characteristics of the study sample, showing that the final study sample was collected with 269 tourists, of which 46.5% were male and 53.5% were female. Tourists participating are mainly from 18-29 years old (69.1%), 30-39 years old (13.4%), under 18 years old (7.1%), 40-49 years old age (6.7%) and 50-59 years old (3.7%). Survey subjects are of different ages, so their income levels

are different, income is less than 5 million/month (45.7%), followed by income from 10-15 million/month (19.3% ) income from 5-10 million/month (19.0%), income over 20 million/month (11.2%) and income from 15-20 million/month (4.8%). Regarding provinces and cities, tourists are in Hanoi (9.7%), in Ho Chi Minh City (9.7%), in Da Nang (27.5%) and mainly come from provinces and cities. other (53.2%).

**Table 1: Study sample characteristics**

Characteristic	Quantity	Ratio (%)	Characteristic	Quantity	Ratio
Research sample	269	100	Income		
Sex			Under 5 million/month	123	45.7
Male	125	46.5	from 5-10 million/month	51	19.0
Female	144	53.5	From 10-15 million/month	52	19.3
Age			From 15-20 million/month	13	4.8
Under 18	19	4.8	Over 20 million/month	30	11.2
18-29 years old	186	69.1	City		
30-39 years old	36	13.4	Hanoi	26	9.7
40-49 years old	18	6.7	Ho Chi Minh City	26	9.7
From 50-59 years old	ten	2.7	Danang	74	27.5
Over age 60	0	0	Other	143	53.2

#### 4.2. Scale reliability

Table 2 shows that, the results of Cronbach’s Alpha test are within the appropriate allowable level, no variables are excluded from the model. Therefore, confirmatory factor analysis is performed for the variables in the model.

**Table 2. Cronbach’s Alpha reliability analysis results**

Scale	Symbol	Number of observed variables	Item-Total Correlation	Cronbach’s Alpha
Entertainment	ENT	4	>= 0.596	0.887
Trending	TRUE	3	>= 0.637	0.814
Interact	INT	4	>= 0.786	0.920
Electronic word of mouth	EWOM	3	>= 0.666	0.879
Custom	CUS	4	>= 0.328	0.848
Destination decision to Hue	DS	3	>= 0.574	0.809

All scales have Cronbach’s Alpha coefficient > 0.6 and the total correlation coefficient of the variables in each scale are > 0.3. Therefore, all variables meet the requirements and conduct exploratory factor analysis EFA.

#### 4.3. Exploratory factor analysis

Tables 3 and 4 present the results of the EFA exploratory factor analysis of the evaluation scale of marketing activities about Hue tourism on the social network Tiktok and the scale of deciding to choose Hue tourism. KMO coefficient = 0.768 > 0.5, so factor analysis is appropriate, Sig value. = 0.000 < 0.05, so the variables are correlated with each other in the population.

There are 5 factors extracted based on the Eigenvalue > 1 criterion, so these 5 factors summarize the information of 18 observed variables included in EFA in the best way. The total variance extracted by these 5 factors is 77.753% > 50%, so these 5 factors explain 77.753% of the data variation of 18 observed variables participating in EFA, observed variables have coefficients. loading > 0.5, so the evaluation factors of marketing activities about Hue tourism on the social network Tiktok are appropriate and satisfy the

conditions, specifically, 18 observed variables after performing the analysis are combined into 5 factors: Prize Location, Trending, Interactive, Electronic Word of mouth, Customization.

**Table 3 . The results of exploratory factor analysis EFA**

Variable	KMO	Sig	Eigen value	Extracted Variance (%)	Loading
1. Factors evaluating marketing activities of Hue tourism on Tiktok	0.768	0.000	1.111	0.7775	0.507-0.912
Entertainment					0.703-0.898
Trending					0.705-0.844
Interaction					0.788-0.875
Electronic word of mouth					0.839-0.909
Customization					0.507-0.912
<b>2. Destination decision to Hue</b>	<b>0.681</b>	<b>0.000</b>		0.7363	0.627-0.807

**Table 4 . EFA factor analysis results of the factors**

TT	Factor	Observed variables	Factor				
			F1	F2	F3	F4	F5
1	Interaction	INT1	0.875				
		INT2	0.856				
		INT3	0.845				
		INT4	0.788				
2	Entertainment	ENT3		0.898			
		ENT2		0.878			
		ENT1		0.874			
		ENT4		0.703			
3	Customization	CUS2			0.912		
		CUS3			0.892		
		CUS1			0.879		
		CUS4			0.507		
4	Electronic word of mouth	EWOM3				0.909	
		EWOM1				0.900	
		EWOM2				0.839	
5	Trendiness	TRE3					0.844
		TRE1					0.777
		TRE2					0.705

**4.4. Regression analysis and model testing**

The analysis results show that the research model is consistent with the Sig significance level. <5%. The coefficient  $R^2=0.572$  and the correction coefficient  $R^2$  is 0.314, showing that 31.4% of the variability is explained



by the five components that evaluate the marketing activities of Hue tourism on Tiktok to the decision to choose Hue tourism. The results of ANOVA analysis and F test (Table 5) show that the statistical value is calculated from  $R^2$  the Sig value. = 0.000 (<0.05). This proves that the linear regression model fits the research data.

**Table 5 . The results of the regression analysis of the research model**

Variables	Unstandardized coefficients		Standardized coefficient	t	Significance level (Sig.)	Collinearity statistics	
	B	Error				Tolerance	VIF
Constant	1,978	0.421		4.701	0.000		
Entertainment	0.182	0.069	0.155	2,640	0.009	0.738	1.355
Trending	0.069	0.067	0.066	1.033	0.303	0.635	1.574
Interact	0.095	0.067	0.092	1.403	0.162	0.590	1.694
Electronic word of mouth	0.282	0.038	0.394	7.394	0.000	0.901	1.110
Custom	0.120	0.055	0.130	2.194	0.029	0.724	1.381
<b>Test Indicators</b>							
$R^2$					0.572		
$R^2$ correction					0.314		
F-Statistics (Sig.)					22,528 (0.000)		
Durbin – Watson					1,720		

The results of regression analysis (Table 5) show that the factor of Trendiness, Interaction has Sig value. t-test is 0.303 and 0.162 respectively, which are > 0.05, so these two factors do not have a statistically significant impact on the decision to choose Hue tourism. The remaining three factors are Entertainment, Electronic Word of mouth , Custom Valuable Sig. = 0.009; 0.000; 0.029 < 0.05, so these three factors have a positive impact on the dependent variable The decision to choose Hue tourism has statistical significance.

Standardized regression equation:

$$Y = 0.394*EWOM + 0.155*ENT + 0.130*CUS$$

The results show that the electronic word of mouth factor ( $\beta=0.394$ ) has the strongest impact on the decision to choose Hue tourism. On the social media channel Tiktok, there is also an account specializing in reviewing Hue tourism including landscapes, specialties, traditions, ... and achieved very good outreach effect. It shows that the intention to visit Hue and the intention to return of tourists is created depending on the shared content (including images, sounds, ...) from this review channel and from other websites. users have come to Hue tourism. This is similar to Rimadias (2020)'s study showing the important role of Electronic Word of mouth.

The second is the entertainment factor (beta = 0.155), which affects the formation of Hue tourism decisions because this is the basis for creating excitement from visitors, leading to sharing, posting, etc. Electronic word of mouth element included.

The third is the Custom factor (beta = 0.130). This shows that customers want to receive highly customized and personalized marketing messages instead of generic information. This is also a common feature of new media, as well as media requirements for the new generation of young customers.

Factor Interaction (beta = 0.092 ) does not guarantee statistical significance in the research model. This shows that, on Tiktok social media, the chat interaction between tourists is not really popular and this factor does not affect the decision to choose a tourist destination in Hue.

Besides, the Trendiness factor (beta = 0.039) also does not guarantee statistical significance in the research model. In fact, this factor can affect the decision to choose a tourist destination in Hue because this is the basis for creating interest from visitors, leading to sharing, posting, etc. Entertainment and Electronic

Word of Mouth; There are many trends in Tiktok – factors that help your videos reach more viewers and promote stronger promotion. However, it may be due to the specific characteristics or the time when the author surveyed visitors or the questionnaire for this factor can be confusing, leading to the fact that this factor does not affect or has a negligible effect.

The research results made a discovery when it was the first topic to research on Tiktok social media about Hue tourism. This study highlights the electronic word of mouth (EWOM) element in communicating and sharing information to potential users or those who have used products/services by means of Tiktok social media.

Because this is a research model that has not yet appeared in Vietnam and there are no similar results in related studies, it is not appropriate to compare the data results between this study and other previous studies.

## 5. CONCLUSION

The objective of this study is to test the components of evaluating marketing activities of Hue tourism on Tiktok to the decision to choose Hue tourism. With the above research results as a basis, to provide some useful information for administrators to improve, maintain or improve the factors that contribute to the decision to choose tourism. Hue. The research results show that the three factors of Tiktok social media marketing that affect the destination choice decision are Electronic Word of mouth, Entertainment, and Customization. Two factors that do not have a statistically significant impact are Interaction and Trend.

From the research results, businesses and organizations operating in the field of tourism communication can come up with a more effective marketing strategy on social networks. Specifically, it is advisable to create communication messages that are highly contagious, helping tourists to spread the word of information to other visitors. Communication should be presented for entertainment, not simply for information. In addition, focus should be on Customization, which is personalized and tailored to the needs of each traveler. The other two factors, Interaction and Trending, have no statistically significant effect as well as no negative effect. Tourism businesses and media organizations can consider these two factors further when resources permit.

This study has some limitations since it only focuses on TikTok users aged 18 - 29 years. Firstly, the sampling method is convenient at tourist attractions, so it is not representative and may not include some specific types of tourism. Second, the study only focused on domestic tourists to Hue. Further studies should be carried out on many other tourist destinations and international tourist surveys. Further research can focus on a wider range of objects on tourism in various regions in Vietnam such as Da Nang, Ha Noi, Ho Chi Minh City, etc. Then further research can use other applications to be researched such as Youtube, Facebook, Twitter, etc. Similar research can be done using based on the TikTok phenomenon which is quite rapidly developing as one of the social media. In the future, the social media marketing model can be used to assess the effectiveness of travel media in Hue by using TikTok application.

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## FACTORS INFLUENCING CUSTOMERS' DECISION TO PURCHASE ENVIRONMENTALLY-FRIENDLY FOOD IN THE HUE CITY OF HUE

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**Abstract:** *The growing global demand for environmentally friendly food can be attributed to increasing concerns regarding health and environmental issues. To facilitate the adoption of eco-friendly food purchasing decisions, it is crucial to examine consumer behavior towards such products. This study aims to investigate the various factors that influence customers' decisions to purchase eco-friendly food in Hue city. In order to achieve this objective, a quantitative approach was employed, utilizing a survey conducted among 225 customers. The sample was selected through convenient sampling from individuals who have shopped, are currently shopping, or plan to shop at Dien May Xanh supermarkets in Thua Thien Hue province. Multiple linear regression analysis was utilized to test the hypotheses. The results indicate that environmental attitude, price, consumption attitude, subjective norms, and eco-friendly food knowledge all have positive effects on customers' decisions to purchase eco-friendly food. These research findings offer valuable insights for businesses, policymakers, and marketers, providing effective strategies for promoting customers' decisions to purchase eco-friendly food.*

*Keywords:* eco-friendly food; purchasing decision; influential factors; Hue city

### 1. INTRODUCTION

Organic food, as defined by JI Rodale, a prominent figure in the field of organic farming in the United States, is distinguished by its lack of pesticides and chemical fertilizers. The global demand for organic food has experienced a notable surge, driven by its perceived benefits for both health and the environment. Consequently, this study aims to delve into the decision-making process of customers when it comes to purchasing eco-friendly food in Hue city, Vietnam, with a particular emphasis on the factors that influence their choices. The city's distinct culinary and cultural heritage, alongside increasing urbanization and a growing awareness of health among its residents, presents an intriguing context for investigating consumer behavior in relation to eco-friendly food.

Existing research conducted by Dang and Nguyen (2020) indicates a rising trend in customer awareness and demand for organic food in Vietnam, primarily motivated by concerns about food safety and environmental sustainability. Notably, Hue city, located in central Vietnam, serves as a significant market for organic food products due to its strong agricultural tradition and local culinary culture (Pham, 2018). However, limited research has been conducted specifically on consumer behavior and decision-making pertaining to eco-friendly food in this region.

To address this research gap, a quantitative approach will be employed in this study. Drawing upon the theoretical framework of the Theory of Planned Behavior (TPB) proposed by Ajzen (1991), the research will explore various factors, including environmental attitude, price, convenience availability, consumption attitude, subjective norms, and eco-friendly food knowledge.

By gaining insights into the motivations driving customers' decisions to purchase eco-friendly food,

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this study will contribute to the existing body of knowledge concerning consumer behavior in the eco-friendly food market. The findings will offer valuable implications for businesses, policymakers, and marketers who aim to promote eco-friendly food consumption and develop tailored strategies that align with the specific context of Hue city, Vietnam.

## **2. BACKGROUND AND HYPOTHESES**

### **2.1. Theoretical framework**

In order to comprehensively analyze customers' purchasing decisions regarding organic food, it is crucial to understand the underlying factors that influence these decisions. Samantha Smith and Angela Paladino (2010) have developed a decision model for purchasing organic food that encompasses inputs, intermediaries, and outcomes. Additionally, this study incorporates relevant theories related to purchasing decisions and builds upon previous research on organic food purchasing decisions as a theoretical foundation. The theories of rational action and planned decision-making, proposed by Ajzen and Fishbein (1980) and Ajzen (1991) respectively, have been extensively utilized in foundational research to comprehend and predict customer purchasing decisions.

The Theory of Planned Behavior (TPB), which has been widely employed in organic food research (Magnusson et al., 2001; Tarkiainen and Sundqvist, 2005), is adopted in this study, following the approach of previous studies. The Theory of Reasoned Action (TRA) suggests that decisions are determined by the evaluation of specific intentions to act (Ajzen, 1991). The concept of decision incorporates the exertion of effort and willingness to implement the decision, encompassing motivations (Ajzen, 1991). Intentions are considered as antecedents to decisions and are regarded as the most reliable predictors of actual decisions (Ajzen, 1991; Ajzen, 2002). To account for situations where individuals may lack complete control over their decisions, such as when product availability constraints influence their purchasing choices, the cognitive element of decision control was introduced to the TRA, leading to the development of the TPB (Ajzen, 1991).

### **2.2. Hypothesis development**

Within the background of TPB, this study develops a conceptual framework shown in Figure 1 for investigating factors influencing customers' decisions to purchase organic food in Hue city. The proposed framework hypothesizes that the customers' decisions to purchase organic food are positively impacted by environmental attitude, price, convenience availability, consumption attitude, subjective norms, and organic food knowledge.

#### **Environment attitude**

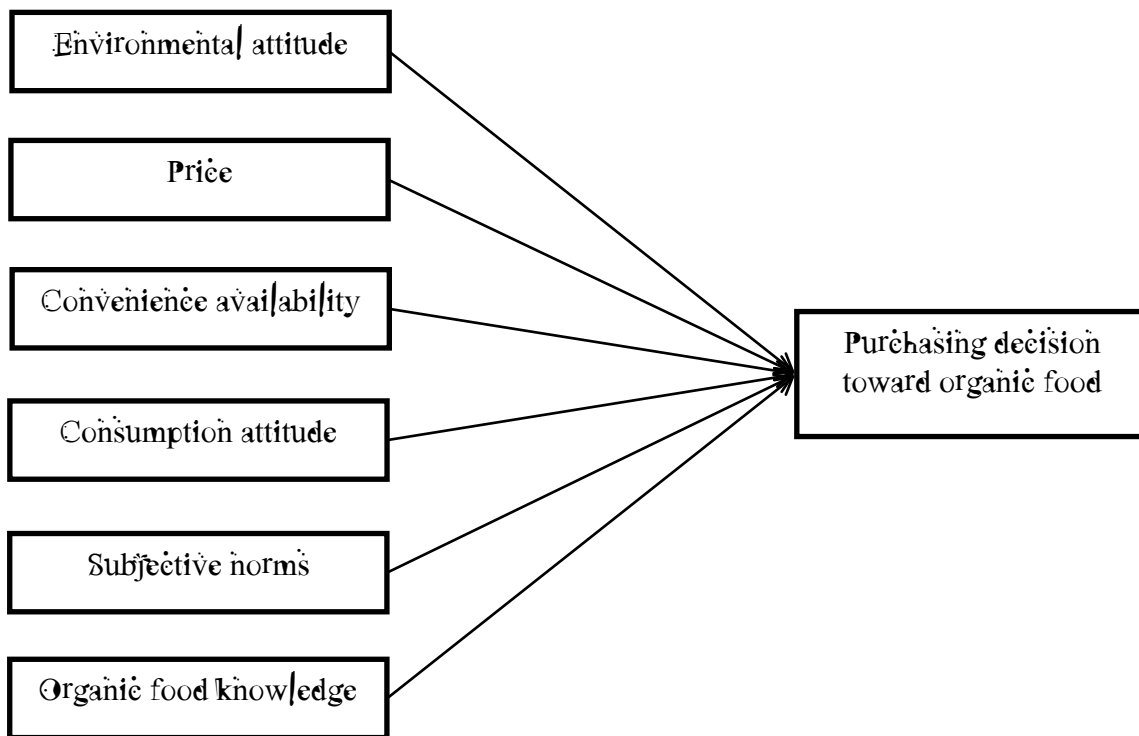
Individual attitudes are conceptualized as the positive or negative sentiments experienced by individuals during the decision-making process (Schiffman et al., Kanuk, 1987). Attitudes play a critical role in shaping individuals' preferences for purchasing, making them a key predictor of decision-making. Previous studies have consistently highlighted the significant influence of attitudes on decisions, with attitude often considered the primary indicator for predicting decisions (Rana & Paul, 2017).

In particular, attitudes towards the environment have been widely recognized as a crucial determinant of decision intentions (Chan & Lau, 2001; Wesley et al., 2012; Law et al., 2017). Consequently, the current study aims to investigate the impact of customers' environmental attitudes on their decisions to engage in environmentally responsible consumption. Based on this, the following research hypothesis is proposed:

Hypothesis: Customers' environmental attitudes positively influence their decisions to engage in environmentally responsible consumption.

By examining the relationship between customers’ environmental attitudes and their decisions to engage in environmentally responsible consumption, this study seeks to contribute to the understanding of consumer behavior in relation to eco-friendly food choices.

*H1: Environmental attitude positively influences the decision to purchase organic food.*



**Figure 1. The conceptual framework**

Source?

**Price**

Customers commonly perceive organic food as being more expensive compared to conventional alternatives (Lea and Worsley, 2005; Magnusson et al., 2001; Raman, 2005). Research by Magnusson et al. (2001) indicates that price is a significant factor influencing consumers’ purchasing decisions, with the expectation that organic food should not carry a higher price tag than conventional products. This implies that customers seek value for their money and require justifiable reasons to justify paying a higher price (Hill and Lynchehaun, 2002; Padel and Foster, 2005). However, providing such justification can be challenging, as customers often lack sufficient information to fully evaluate their purchases (Padel and Foster, 2005). Consequently, customers’ willingness to pay a higher price for organic food is linked to their knowledge of organic food. They seek reasons, such as superior quality or better taste, to justify the premium price associated with organic food.

Price is frequently identified as a significant barrier to purchasing organic food (Lea and Worsley, 2005; Magnusson et al., 2001; Padel and Foster, 2005; Tregear et al., 1994). This barrier is particularly prominent among low-income individuals, for whom high prices can make purchasing organic food difficult or even unfeasible (Tarkiainen and Sundqvist, 2005). However, research suggests that the majority of consumers would increase their consumption of organic food if the price premiums were reduced (Radman, 2005; Lea and Worsley, 2005). While organic food prices generally exceed those of conventional products, prices in certain categories are gradually aligning with conventional goods (Willer and Yussefi, 2006). Therefore,

there is a need to further understand price perceptions in the context of purchasing decisions. It is worth noting that some consumers are willing to pay higher prices for organic food (Lockie et al., 2004; Hutchins and Greenhalgh, 1997; Raman, 2005). Studies have found that customers are willing to spend an additional 10-20% for organic food on average (Lockie et al., 2004; Hutchins and Greenhalgh, 1997; Raman, 2005). This indicates that price premiums may not be a significant barrier to consumer purchases. However, price often conflicts with other motivations, such as environmental concerns (Lockie et al., 2002). In other words, customers may be motivated to purchase organic food due to environmental considerations, but the high prices may limit their ability to do so. Additionally, consumers may face a trade-off between purchasing organic food and allocating money to other luxury items (Tarkiainen and Sundqvist, 2005). This highlights the fact that the organic food market competes not only with conventional food products but also with other commodities.

A willingness to pay a higher price is closely linked to perceptions of quality. Hoang (1996) found that customers are not willing to pay premium prices for organic food if they perceive them to have any defects or image flaws. This suggests that consumers are more inclined to pay higher prices for organic food when they perceive it to be of higher quality compared to cheaper conventional substitutes. Thus, the following hypothesis is proposed:

Hypothesis: Customers' willingness to pay a higher price for organic food is positively influenced by their perceptions of higher quality compared to conventional alternatives.

By examining the relationship between customers' price perceptions, quality perceptions, and willingness to pay for organic food, this study aims to contribute to a better understanding of the role of price in consumers' decision-making processes when it comes to organic food purchases.

*H2: Price positively influences the decision to purchase organic food.*

### **Convenience availability**

Convenience, in the context of purchasing organic food, refers to the ease of availability and the convenience of food preparation at home (Lockie, 2002). Lockie et al. (2004) indicated that a significant barrier to increasing organic food consumption is customer concerns about the convenience associated with purchasing and preparing organic food products. This finding is supported by Mathisson and Scholin (1994), who found that convenience-related factors discourage customers from switching to organic products (as cited in Magnusson et al., 2001). Moreover, Jolly (1991) discovered that the perceived inconvenience of searching for organic products can hinder consumer purchases (as cited in Magnusson et al., 2001)

Hill and Lynchehaun (2002) suggest that customers need to be motivated to switch from their regular brand to an alternative option. Research indicates that transitioning to eco-labeled food products requires consumers to change their habits (Grankvist and Biel, 2001), which requires effort on their part. Furthermore, studies have demonstrated that consumers are unwilling to exert excessive effort to purchase organic food (Padel and Foster, 2005).

Based on the aforementioned arguments, this study proposes the following hypothesis: H3????

### **Consumption attitude**

Attitudes, as defined by Fishbein and Ajzen (1975), encompass individuals' positive or negative evaluations of a specific decision. Similarly, Hoyer et al. (2012) consider attitudes as individuals' positive or negative evaluations of an object, action, problem, or person. MacKenzie et al. (1986) suggest that attitudes should be measured from two perspectives: cognitive and emotional. The cognitive aspect involves evaluation, while the affective aspect involves enjoyment. Sears et al. (1991) propose that attitude



assessment encompasses three aspects: perception, emotion, and decision. Ajzen (2008) introduces two assessment systems, instrumental assessment (whether it is valid or not) and empirical assessment (whether it is interesting or not), which influence attitude bias. In the context of organic food research, the attitudinal variable is often examined in terms of the attitude towards the decision to purchase organic food. Building upon these concepts, the study proposes the following hypothesis:

*H4: Consumption attitude positively influences the decision to purchase organic food.*

#### **Subjective norms**

Subjective norms can be defined as the internalized perception of the desire for the key individuals in the decision maker's life to see them behave in a certain way (Oliver and Bearden, 1985). In simpler terms, subjective norms represent the "perceived social pressure" that individuals feel to make a particular decision (Ajzen, 1991). These norms are influenced by the preferences of reference individuals and their intentions to act in accordance with those preferences (Oliver and Bearden, 1985).

Previous research has demonstrated that subjective norms play a significant role in shaping purchasing decisions (Ajzen, 1991). Bearden et al. (1989) highlight the importance of social influence in determining decisions. Kalafatis et al. (1999) note that engaging in socially commendable actions enhances self-esteem and pride, while failing to do so can lead to feelings of shame. This is particularly relevant to this study as organic consumption has relatively low visibility, implying that subjective norms may have a lesser influence on organic purchasing decisions. While previous studies have differentiated subjective norms based on the effects of different reference groups such as friends, government, and experts on individual decision makers (Parks, 2000), this study does not make such distinctions and considers subjective norms as a unified construct in their influence on the purchasing decision toward organic food. As such, the following hypothesis is proposed:

*H5: Subjective norms positively influence the decision to purchase organic food.*

#### **Organic food knowledge**

Knowledge is widely recognized as a significant influencer in the consumer decision-making process (Laroche et al., 2001). Hill and Lynchehaun (2002) support this notion by identifying knowledge as the primary influencing factor in organic product purchases. Moorman et al. (2004) also found that subjective knowledge influences consumer choices as individuals tend to act in accordance with their knowledge.

Existing research suggests that customers possess a basic understanding of the term "organic" and associate it with being free of chemicals (Hutchins and Greenhalgh, 1997). Lyon et al. (2001) further describe consumers' perception of organic products as natural, raw, and less processed compared to conventional products. However, studies conducted by Hill and Lynchehaun (2002) reveal that while customers grasp the fundamental characteristics of organic products, they lack a deeper understanding of organic farming methods and how they differ from conventional methods. Other research also supports these findings, indicating that customers have limited knowledge of the organic farming certification process (Lockie et al., 2002) and are unfamiliar with the inspection procedures associated with organic production (Padel and Foster, 2005). This indicates that although customers have a basic definition of organic, they lack comprehensive knowledge of its meaning and production processes. Thus, knowledge becomes a crucial influencing factor in the decision to purchase organic food.

Based on the above discussion, the following hypothesis is proposed:

*H6: Organic food knowledge positively influences the decision to purchase organic food.*

### **3. RESEARCH METHOD**

#### **3.1. Data collection**

Quantitative data were collected by using questionnaires to evaluate the relationships as presented in Figure 1. The answers are measured on a 5-point Likert scale: 1 = Strongly disagree, 2 = Disagree, 3 = Neutral (moderate), 4 = Agree, 5 = Strongly agree.

The sample size for this study was determined using the estimation method suggested by Hair et al. (2019), which indicates that a minimum of five samples per estimated parameter is required. Considering the scale used to evaluate customers' decision to purchase organic food, which includes six independent variables and 19 criteria, the minimum sample size was calculated as  $6 \times 19 = 96$ . In order to enhance the representativeness of the sample and ensure a more robust analysis, a total of 234 survey questionnaires were distributed, out of which 225 valid responses were obtained and included in the analysis.

Regarding the demographic composition of the study sample, the proportion of males was 22.2%, while females accounted for 77.8%. The majority of respondents fell within the age group of 20 to 30 years. In terms of occupation, individuals engaged in trading business represented the highest percentage at 32.4%. Furthermore, it was observed that individuals with incomes exceeding 15 million dong constituted the largest proportion at 24.0%. These findings suggest that purchasing organic food may be perceived as an option primarily among individuals with higher income levels.

In summary, the study sample was selected to achieve a higher degree of representativeness within the population under investigation. The collected data will be subjected to further analysis in order to explore the relationships between the identified independent variables and customers' decision-making processes regarding the purchase of organic food.

#### **3.2. Statistical analysis**

In this study, Cronbach's Alpha coefficient was initially employed to assess the internal consistency of the variables and identify any inappropriate variables. Furthermore, exploratory factor analysis was conducted to reduce the large set of variables into a smaller, more manageable set. During this process, variables with factor loading coefficients that differed by less than 0.3 were eliminated (Sandro, 2000). To determine the influence of the independent variables on the dependent variable, multiple linear regression analysis was performed using the method. This analysis helps identify the significance and strength of the relationships between the independent and dependent variables. Additionally, the one-sample t-test method was utilized to assess the suitability of the optimal model. This method compares the means of a sample to a known population mean and determines if there is a statistically significant difference. Furthermore, one-way ANOVA analysis was employed to examine the suitability of the optimal model. This analysis allows for the comparison of means across different groups to determine if there are any significant differences. By employing these statistical methods, the study aims to establish a robust and reliable model that explains the relationship between the independent variables and the dependent variable.

### **4. RESULTS AND DISCUSSION**

#### **4.1. Results**

##### **4.1.1. Scale reliability test results**

To assess the reliability of the observed variables, a scale test is conducted using Cronbach's Alpha coefficient. This coefficient measures the degree of correlation among the variables in the questionnaire, capturing the consistency and internal reliability of the scale (Hays, 1983). Researchers commonly use Cronbach's Alpha to evaluate variables, with the following criteria: Variables with a corrected item-total

correlation greater than 0.3 and a Cronbach's Alpha coefficient greater than 0.6 are considered acceptable and included in subsequent analysis and processing.

The research findings provide the Cronbach's Alpha coefficient for each variable, indicating the reliability of the scale. These results are presented in the accompanying table, allowing for an evaluation of the internal consistency of the variables and their suitability for further analysis and interpretation.

**Table 1. The results of Cronbach's Alpha**

Variable group	Quantity variable	Cronbach's Alpha
Environmental attitude (NTVMT)	4	0.858
Price (GCSP)	4	0.818
Convenience availability (TTSC)	3	0.865
Consumption attitude (TDTD)	3	0.769
Subjective norms (CCQ)	5	0.831
Organic food knowledge (KTVHC)	3	0.758

(Source: The data analysis results, 2023)

#### 4.1.2. Exploratory factor analysis results

After ensuring the reliability of the scale, the study proceeded with exploratory factor analysis (EFA). EFA is a technique used to summarize and reduce data, making it particularly useful in identifying the variables relevant to the research problem and establishing relationships between them. During EFA, the Kaiser-Meyer-Olkin (KMO) measure is used to assess the suitability of factor analysis. The KMO value should fall between 0.5 and 1 for the analysis to be considered appropriate. If the KMO value is below 0.5, it indicates that factor analysis may not be suitable for the dataset (Hair et al., 2019).

Furthermore, the Eigenvalue criterion is utilized in EFA to determine the number of factors to retain. Factors with Eigenvalues greater than 1 are considered meaningful and retained in the model. The Eigenvalue represents the amount of variation explained by each factor, and factors with Eigenvalues less than 1 do not summarize information better than the original variables.

An important output of factor analysis is the component matrix or rotated component matrix. This matrix consists of coefficients that represent the standardized variables in relation to the factors. The factor loading coefficients indicate the correlation between variables and factors, reflecting the strength of the relationship between them.

Additionally, the KMO coefficient and Bartlett's test are performed as part of the analysis. The purpose of these tests is to reject the hypothesis that variables are not correlated with each other in the population. If this hypothesis is not rejected, it suggests that factor analysis may not be appropriate for the dataset.

By examining the results of the factor analysis, the study aims to determine the underlying factors and their relationships, allowing for a more concise and interpretable representation of the data. Table 2 and 3 indicate results of EFA analyses of independent variables and dependent variables, respectively.

**Table 2. Results of EFA analysis of independent variables**

KMO and Bartlett's Test		
KMO coefficient		0.713
Bartlett's test	When Squared (Chi-Square)	2590.701
	DF	300
	Sig.	0.000

(Source: The data analysis results, 2023)

**Table 3. Results of EFA analysis of dependent variables**

<b>KMO and Bartlett's Test</b>		
<b>KMO coefficient</b>		<b>0.648</b>
Bartlett's test	When Squared (Chi-Square)	101,759
	Standard Deviation (df)	3
	Significance level (Sig.)	0.000

(Source: The data analysis results, 2023)

As Tables 2 and 3 show, the analysis includes the KMO (Kaiser-Meyer-Olkin) test and the Bartlett test. The KMO coefficient, which measures the sampling adequacy for factor analysis, has a value of 0.648. Since the KMO coefficient falls within the acceptable range of 0.5 to 1, it indicates that the observed variables are correlated with each other within the factor. Additionally, the statistical significance (Sig) value of 0.000 (less than 0.05) obtained from the Bartlett test confirms that the exploratory factor analysis is appropriate for the data. These results suggest that the variables are suitable for further analysis and interpretation using factor analysis.

**Table 4. The dependent variable factor rotation matrix**

<b>Component Matrix <sup>a</sup></b>	
	<b>Factor loading</b>
QD1	0.670
QD2	0.577
QD3	0.561
Eigenvalues	1.884
Cumulative Variance (%)	62.784

(Source: The data analysis results, 2023)

The load coefficient values >0.5 satisfy the condition, so the observed variables are kept. The observed variables of the dependent variable only single out one factor, proving that the scale ensures unidirectionality, the observed variables of the dependent variable converge quite well. The analysis results show that there is a factor extracted at Eigenvalue equal to 1.884 > 1. This factor explains 62.784 % of data variation of 3 observed variables participating in EFA.

**4.1.3. Correlation regression analysis**

From the results of running EFA analysis, there are 6 independent variables when included in the regression. After the correlation test, the remaining factors are 5 factors affecting the decision to purchase organic food in Hue: environmental attitude (NTVMT), price (GCSP), consumption attitude (TDTD), subjective norms (CCQ), and organic food knowledge (KTVHC ).

The study carried out tests on the relevance of the correlation model (adjusted R<sup>2</sup> value is 0.988 (>0.5) and Sig. of the F test is 0.000 (<0.05)), as well as test determine the defects of the model (Durbin-watson value = 1.396 < 2.6 and VIF values are all less than 10). This proves that the theoretical model also meets the requirements to ensure meaningfulness.

Test the accepted statistical hypotheses (NTVMT, GCSP, TDTD, CCQ, KTVHC) with the corresponding standardized regression coefficients of 0.435; 0.292; 0.412; 0.369; 0.459. The corresponding t-statistic values are, respectively. The general regression equation of the model is rewritten as follows:

$$QD = 0.004 + 0.435 \times NTVMT + 0.292 \times GCSP + 0.412 \times TDTD + 0.369 \times CCQ + 0.459 \times KTVHC$$

Through the coefficient  $\beta$  in the regression model, we know the importance of the factors participating in the equation. The coefficients  $\beta$  all have positive values, showing that the independent variables all

have the same effect on the dependent variable. Any change in the above factors can influence customers' decision to purchase organic food in Hue city. The results show that Organic food knowledge has the highest standardized Beta coefficient ( $=0.459$ ), reflecting the strongest impact on customers' decision to purchase organic food in Hue city. This is followed by the Environmental attitudes ( $=0.435$ ), Consumption attitude ( $=0.412$ ), Subjective norms ( $=0.369$ ), and finally Price with the same standardized beta of 0.292.

#### 4.1.4. One-sample t-test for the factor

One-sample t-test is a hypothesis test about the population mean, used to compare the mean of a population with a specified value (Test value).

**Table 5. Results of one sample t-test of independent variables**

Factor groups	Mean	Test value	Level of significance
NTVMT	3.46	3	0.000
GCSP	3.86	3	0.000
TDTD	3.82	3	0.000
CCQ	3.51	3	0.000
KTVHC	3.31	3	0.000

(Source: The data analysis results, 2023)

The results of one sample t-test analysis by each factor in the decision to purchase organic food in Hue city are shown in Table 5. This analysis aims to test the difference between the mean value of the factors and the test value used (value = 4).

The results show that all factors have a fairly high average value. For example, the mean value of the factor "Environmental attitude" (NTVMT) is 3.46, "Price" (GCSP) is 3.86, "Consumer attitude" (TDTD) is 3.82, The "subjective norm" (CCQ) is 3.51, and "Organic food knowledge" (KTVHC) is 3.31.

However, when conducting one sample t-test, these mean values are not significantly different from the test value used of 3. All factors have the same significance level (Sig) of 0.000, indicating that the difference is very small and insignificant.

This result shows that the factors in the decision to purchase organic food in Hue have no significant difference with a test value of 3. This may indicate that customers in Hue tend to accept, recognize, and appreciate factors related to organic food, including environmental attitudes, prices, consumption attitudes, subjective norms, and food knowledge.

#### 4.2. Discussion

The theoretical framework of this research is rooted in the model developed by Samantha Smith and Angela Paladino (2010), which explores the factors influencing the decision to purchase organic products. Additionally, the theories of rational action and planned behavior, specifically the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB), serve as fundamental frameworks to understand and predict consumer purchasing decisions.

The TRA, initially proposed by Ajzen and Fishbein (1980) and further developed by Ajzen (1991), suggests that decisions are made based on the evaluation of desirability and expectations associated with a particular behavior. In the context of this study, the decision refers to the effort an individual is willing to invest in implementing the decision, including their motivations. The TRA considers decisions as crucial antecedents to behavior and views them as strong predictors of actual behavior.

Building upon the TRA, Ajzen (1991) introduced the TPB, which incorporates the concept of cognitive decision control. This addition addresses situations where individuals may have restricted decision-

making control,, for instance when product availability limits their choices. The TPB extends the TRA by considering external factors and perceived behavioral control in the decision-making process. It recognizes that individuals' decisions and behaviors are influenced not only by their attitudes and subjective norms but also by their perceived control over the decision.

These theoretical frameworks, including the TPB and TRA, have been widely applied in previous research on consumer behavior, including studies focused on organic products (e.g., Magnusson et al., 2001; Tarkiainen and Sundqvist, 2005). Consistent with these prior studies, the current research incorporates the TPB to understand and predict customers' decisions to purchase organic products.

By utilizing these established theories and frameworks, this study aims to provide valuable insights into the decision-making process of customers when purchasing eco-friendly food in Hue city, Vietnam. It seeks to identify the factors that influence their choices and contribute to the existing body of knowledge on consumer behavior in the eco-friendly food market.

## 5. CONCLUSION

This study identifies five factors that influence the decision to purchase organic food: (1) Environmental attitude, (2) Price, and (3) Consumption attitude, (4) Subjective norms, and (5) Organic food knowledge. These factors are derived from the theoretical framework of organic food purchase decisions, consumer behavior theories, and previous research on the topic. Among these five factors, "Organic food knowledge" has the strongest impact on the purchasing decision of customers in Hue city, followed by "Environmental attitudes", "Consumption attitudes", "Subjective norms", and finally "Price," which has the weakest influence.

The study reveals that most respondents in Hue city have a relatively positive assessment of their decision to purchase organic food (towards agreement). This indicates a growing demand for organic food in the city, as well as the recognition of environmental concerns. Consequently, businesses face challenges in developing strategies to attract customers in this context. Therefore, it is crucial for businesses to promptly plan and adapt their strategies for the increasing trend of the decision to purchase organic food.

It is important to note that this study was conducted over a one-year period in Hue city, which may limit the generalizability of the findings. Because the sample size is limited, the results of the study may be subjective. In addition, several solutions are proposed based on the assessment and analysis of how factors affect the "Consumption decision of customers in Hue City". Overall, this research highlights the factors influencing the decision to purchase organic food in Hue city, emphasizing the significance of food knowledge and the need for businesses to adapt their strategies accordingly. However, it is important to consider the limitations of the study and further research is required to validate and expand upon these findings.

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## VISITORS' ASSESSMENT OF THE TOURISM DESTINATION IMAGE AT HUE CITY

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**ABSTRACT:** *The perception of a tourist destination plays a crucial role in determining the success of its tourism industry. This study focuses on Hue City and utilizes survey data from 100 randomly selected domestic tourists to assess their perception of the destination's image. The findings indicate that the majority of tourists hold positive views and express a willingness to revisit Hue; however, negative opinions about certain aspects of the destination also exist. Based on these results, the study proposes several strategies to enhance tourists' positive experiences, including promoting the destination through television series, encouraging infrastructure development, and diversifying tourism products.*

**Key word:** *Destination image, Tourism, Hue*

### 1. INTRODUCTION

Hue, renowned for its possession of five world cultural heritages and abundant diverse human and natural tourism resources, holds a prominent status as a national tourist destination. The tourism sector has been recognized as a pivotal driver of the province's economy. In conjunction with the establishment of the Hue Festival brand, the province of Thua Thien Hue, specifically Hue city, is diligently striving to cultivate a distinctive tourist destination image that leaves an enduring imprint in the consciousness of every visitor (Nguyen Thi Le Huong & Truong Tan Quan, 2019).

According to statistics of Thua Thien Hue Department of Tourism, the number of tourists visiting in 2018 reached 4.3 million visitors, of which international visitors reached nearly 2.2 million / year, in 2019 reached 4.8 million visitors, of which international visitors reached 2.1 / year. However, by 2020, due to the impact of the Covid pandemic, the total number of visitors to Hue will only reach 1.687 million, a decrease of nearly 65% (of which, international visitors are estimated at 558.841 thousand arrivals, a decrease of nearly 75%). Revenue from tourism reached about 3,839 billion VND, down 66% (Government e-Newspaper, 2020). With the goal of developing tourism into a spearhead economic sector, striving by 2030 to build Thua Thien Hue to become a destination on par with world cultural heritage cities, striving by 2030 to affirm Hue as a destination. As one of the national tourist destinations, tourism services are identified as a key factor in the local development, accounting for over 55% of GDP contribution (TT.Hue Provincial People's Committee, 2013).

Therefore, building a destination image to move towards building a tourism brand in Hue City in particular and Thua Thien Hue province in general is a matter of concern. Striving to 2030 to build Thua Thien Hue to become a destination on par with world cultural heritage cities, striving by 2030 to affirm Hue as one of the national tourist destinations, tourism services are identified and determined to be a

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key factor in local development, accounting for over 55% of GDP contribution (TT.Hue Provincial People's Committee, 2013). Attributes must represent a specific destination image with its features, so the results of studies on tourist destination images show that there is no fixed set of attributes to measure. However, tourists' rational perceptions at a destination can manifest either positively or negatively, so it will affect tourists' evaluations of that destination in the same way (Nguyen Thi Le Huong, 2019). Therefore, this study was conducted with the aim of assessing visitors' perceptions of Hue's tourism destination image, thereby proposing some solutions to contribute to building an attractive image.

## **2. Theoretical foundations**

### *Tourism*

According to the World Tourism Organization (UNWTO), tourism is the activity of going to a place other than the usual human habitation and staying there for sightseeing, rest, entertainment or other purposes. purposes other than remunerated activities in the destination for a continuous period of less than one year.

According to the Law on Tourism of Vietnam (2017), tourism is activities related to the trip of people (individuals or groups) to places not belonging to their regular residence area for the purpose of sightseeing, entertainment, recreation, vacation for a period not exceeding one consecutive year (excluding work purposes).

### *Tourists*

Tourist is a person who travels or combines tourism, except in the case of studying or working to receive income in the destination. Tourists include domestic tourists, international tourists to Vietnam and tourists going abroad (Vietnam Tourism Law, 2017).

### *Travel destinations*

In Vietnam, the Law on Tourism has no concept of tourist destination, only refers to the concept of tourist destination. A tourist destination is understood as a place with attractive tourist resources, serving the sightseeing needs of tourists.

### *Pictures of tourism destinations*

There are many concepts of destination image pointed out by researchers. Considered the pioneers of tourism image research, in the book "Tourism and Resort Development", Baud-Bovy . & Lawson (1977) indicate that destination image is the expression of all knowledge, impressions, imagination, feelings of an individual or a group of people about a certain place. Phelps (1986) states that "Destination image is the perception or impression of a place". Tapachai & Waryszak (2000) define "Destination image is the perception or impression of a destination by tourists with expected benefits and consumption values" (Truong Thi Hoang Hanh, 2017). Although formed in different contexts and times, the above image concepts of destinations all have in common that they focus on the "impression" or "perception" of visitors. The repetition of these terms shows that tourists are the ones who will determine the tourist image of any destination (Nguyen Thi Le Huong & Truong Tan Quan, 2019).

### *Scale and criteria for evaluating tourism destination image*

The difference in factors of each individual will lead to different evaluations of a tourism contract. There are two main groups of factors affecting the formation of tourism contract, namely personal factors and travel experience. In which, cognitive assessment will be based on the individual's beliefs and understanding of a destination; and sentiment evaluation will be based on the individual's feelings towards that destination. Specifically, individual factors include psychological factors such as tourist values, motivations and personality; and social factors such as age, education, marital status and other characteristics (Nguyen Thi Le Huong, 2019).

Attributes must represent a specific destination image with its features, so the results of studies on tourist destination images show that there is no fixed set of attributes to measure for every destination. However, tourists' rational perceptions at a destination can manifest either positively or negatively, so it will affect tourists' evaluations of that destination in the same way (Nguyen Thi Le Huong, Truong Tan Quan, 2017).

Echner and Ritchie (1991) also compiled and organized a list of 34 destination image attributes from 14 studies using structural methods. In which, the number of studies measuring destination image attributes are used a lot, such as: Attractions of landscape, nature, friendliness and sincerity of people, Cost and price., Tourist attractions and activities, Nightlife and entertainment, Sports activities.

Beerli & Martin (2004) gave 9 attributes: (1) Natural resources/Destination attractiveness; (2) Recreation and entertainment; (3) Natural environment; (4) General infrastructure; (5) Culture, history and art; (6) Social environment; (7) Tourism infrastructure; (8) Political and economic factors and (9) Atmosphere to measure destination image.

For the tourist destination of Hue, Lien Tran Thi Ngoc (2015) clarified the Hue city tourism policy through the cultural and historical characteristics with the highlighted attributes: Temples, pagodas and tombs of the Nguyen Dynasty. Le Thi Ha Quyen (2017), added Spirituality, safety, friendliness and Recreational, festival and sports activities to measure tourism performance in Hue city. Nguyen Thi Le Huong & Truong Tan Quan (2019), in the study to measure the tourism satisfaction of Thua Thien Hue tourism, approached according to the components of cognitive image and emotional image, in which 7 factors that make up the image have been identified. Perceptions include: (1) Natural attractiveness, (2) Cultural and historical attraction, (3) Tourism and recreational activities characteristics, (4) Hue uniqueness, (5) Tourism environment and infrastructure, (6) convenient transportation and (7) Accessibility and price.

On that basis, within the scope of this study, the assessment of domestic tourists to the tourism destination Hue City has been considered on the following attributes: (1) Tourism environment; (2) Cultural Heritage; (3) Natural scenic spots; (4) Cuisine; (5) Tourist services and (6) Local people.

### **3. METHODS OF STUDY**

#### **3.1 Data collection**

Secondary data collection method: Secondary data is collected through the Statistical Yearbook of Thua Thien Hue province, from reports of the authorities... In addition, the study also synthesizes many documents from related studies.

Primary data collection method: Primary data was collected through survey 100 tourists by random sampling method. Due to the context of the Covid-19 epidemic, the method was implemented by the research team by designing votes on the Google form tool, then posting on forums, pages, groups about tourism... based on questionnaires designed and prepared for research purposes.

#### **3.2 Analyzing and processing data**

*Data processing methods:*

Secondary and primary data were synthesized and processed using Excel and SPSS software version 26.0.

*Data analysis methods:*

Descriptive statistical methods, synthesis and data analysis to assess the perception of tourist destination image Hue City.

**4. RESULTS**

**4.1. General information about the survey sample**

1. Destination

Among the 100 surveyed tourists, there are tourists from Hue City including 37 subjects (accounting for 37.0%); From Outer province, there are 63 people (accounting for 63.0%); Most of the survey samples are from out-of-province visitors, so the survey results will be more influenced by out-of-province visitors.

**Table 1. General information about the survey sample**

<b>Targets</b>	<b>Quantity (People)</b>	<b>Ratio (%)</b>
Destination		
Hue city	37	37.0
Out of province	63	63.0
Sex		
Male	39	39.0
Female	61	61.0
Age		
15-25	65	65.0
26 - 35	19	19.0
36 -45	8	8.0
Over 45	8	8.0
Job Status		
Students	54	54.0
Working	37	37.0
Unemployed	9	9.0

*Source: Investigation and data processing in 2022*

2. Sex

Based on the results of the table above, we can see that there is a large difference in the sex ratio of Male and Female. Of the 100 surveyed subjects, 39 are male (accounting for 39.0%) and 61 are female (accounting for 61.0%). Since women make up the majority, their opinions about destinations will be more practical, because men are often less interested in this issue.

3. Age

Among the 100 surveyed tourists, there is a group of tourists from 15 to 25 years old, 65 (accounting for 65.0%) with this age group often they will travel to many places, so they will have a practical view for tourism destinations in Hue compared to other provinces. From 26 to 35 years old, there are 19 people (accounting for 19.0%); From 36 to 45 years old, there are 8 people (8.0%); And From 45 years old and above, there are 8 people (accounting for 8.0%).

4. Job Status

Among the 100 surveyed tourists, there are: 54 people are studying (accounting for 54.0%), this shows that the cost of traveling to Hue is not as expensive as other places, so it is attractive to students. There are 37 people working (accounting for 37.0%); and 9 people are unemployed (accounting for 9.0%).

**4.2. Source forming the image of tourism destination**

It is essential to consider the sources of formation of the destination image containing the “beliefs, impressions, emotions and expectations” of each visitor. The formation of the destination image can come from information sources, images and personal factors of the interviewed tourists as shown in Table 2).

**Table 2. Source of image formation of tourism destination for Hue City**

Criteria	Quantity (People)	Ratio (%)
Information sources		
Social networks, newspapers, advertising channels	31	31.0
Friend	18	18.0
Relatives	17	17.0
Growing up in Hue	26	26.0
Other...	8	8.0
Frequency to Hue		
1-3 times	30	30.0
3-5 times	9	9.0
More than 5 times	61	61.0
Number of places to know in Hue		
1-3	20	20.0
3-5	16	16.0
Over 5	64	64.0

Source: Investigation and data processing in 2022

### 1. Sources of information about Hue

Among the 100 tourists surveyed, 31 tourists know about Hue through social networking sites, newspapers, advertising channels (accounting for 31.0%); From Friends has 18 people (accounting for 18.0%); From Relatives, there are 17 people (accounting for 17.0%); Know because Growing up in Hue, there are 26 people (accounting for 26.0%); And 8 people chose other information sources (accounting for 8.0%).

Most people know about Hue through social networking sites, newspapers, and advertising channels, so this helps us know that we need to develop and promote Hue tourism through social networks so that people approached and wanted to visit Hue.

### 2. Number of visits to Hue

Among the 100 surveyed tourists, 30 tourists have been to Hue from 1 to 3 times (accounting for 30.0%); Having been to Hue from 3 to 5 times, there are 9 people (accounting for 9.0%); And Over 5 times, 61 people (accounting for 61.0%) is a very high number, proving that Hue also has many attractive things that make them come back many times. But this number does not show that they come to Hue for what purpose is to visit, experience, or just visit a place in their travel itinerary to another place.

### 3. Number of places in Hue that tourists know

Among the 100 tourists surveyed, there are tourists who know from 1-3 places in Hue, including 20 people (20.0%); Know from 3 to 5 places with 16 people (accounting for 16.0%); And know over 5 places with 64 people (accounting for 64.0%).

## 4.3. Visitors' opinions on tourism destination image Hue City

### 4.3.1. Visitors' assessment of the tourism environment

**Table 3. Visitors' assessment of the destination environment in Hue**

Environment of tourist destinations	Quantity (People)	Ratio (%)
Clean	65	65.0
Normal	33	33.0
Polluted	1	1.0
Other	1	1.0
Total	100	100.0

Source: Investigation and data processing in 2022

*The environment of Hue tourist destinations*

Among the 100 tourists surveyed, there are: 65 people who feel the environment of Hue tourist destinations is clean and beautiful (accounting for 65.0%); The group of tourists who perceive the environment of Hue tourist destinations is usually 33 people (accounting for 33.0%); The group of tourists perceived the environment of Hue tourist destinations to be polluted with 1 person (accounting for 1.0%); And the other perception is that there is 1 person (accounting for 1.0%). The majority of tourists have a good perception of the environment at the tourist destination, which plays an important part in creating a good impression for tourists about the destination.

**4.3.2. Visitors' assessment of history and cultural and traditional heritages**

Of the 88 visitors who felt Interesting, 32 tourists were attracted by Historic Sites (accounting for 36.4%); Attracted by Hue Cuisine has 32 visitors (accounting for 36.4%): these two factors account for equal proportions because historical sites are always open to sell tickets to visitors and especially on major holidays During the year there are also promotions and ticket discounts; In the center of Hue city, there are many restaurants and eateries that are always open, so any visitor at any time can visit the destinations and enjoy the cuisine here. Attracted by Culture/Festival has 12 people (13.6%) because not every time traveling in Hue has big festivals, if you want to experience a big festival in Hue, you have to see for example: In what month is the festival held, so are the royal festivals, so culture - festivals account for a small percentage is inevitable; Attracted by people with 9 visitors (10.2%); And there are 3 tourists attracted for other reasons (accounting for 3.4%).

**Table 4. Cultural heritage and traditional factors attracting tourists to Hue**

Cultural heritage, tradition	Quantity (People)	Ratio (%)
Historical sites	32	36.4
Culture/Festival	12	13.6
Cuisine	32	36.4
Human	9	10.2
Other...	3	3.4
Total	88	100.0

Source: Investigation and data processing in 2022

The historical sites that make the most impression and appreciation for tourists are shown in the following table:

**Table 5. Historical sites make visitors feel most attractive**

Historical heritage	Quantity (People)	Ratio (%)
Modern interior	51	51.0
Mausoleum	17	17.0
Pagoda	18	18.0
Souvenir houses	6	6.0
Other...	8	8.0
Total	100	100.0

Source: Investigation and data processing in 2022

*Historical sites attract most tourists*

Among the 100 tourists surveyed, 51 tourists were attracted by the Citadel (51.0%) because this is the symbolic image of Hue city, the image that when it comes to tourists, they all know it is the image of Hue city. Hue, this place has ancient features, hidden about feudal stories, an idyllic beauty that is nowhere else, skillful architecture so most tourists are attracted here; Attracted by the Mausoleum has 17 people (accounting for

17.0%); The pagoda has 18 people (accounting for 18.0%); The memorial houses have 6 people (6.0%); And 8 tourists were attracted by Other Monuments (accounting for 8.0%). In short, Hue is known as famous for its ancient architectures, is a city of heritages, temples, mausoleums with ancient breath and traditions of an ancient glory, so you should visit this place. New visitors are impressed by these destinations.

**Table 6. Visitors' perceptions of spiritual attractions**

Spiritual tourism	Quantity (People)	Ratio (%)
Beautiful / ancient	74	74.0
Bad / Simple	1	1.0
sacred	23	23.0
Other...	2	2.0
Total	100	100.0

*Source: Investigation and data processing in 2022*

#### *Visitors' opinions on spiritual tourism*

Among the 100 tourists surveyed, there are 74 tourists who have a perception of the beautiful / ancient Kinh spiritual tourism (accounting for 74.0%); Feeling spiritual tourism Sacred has 23 people (accounting for 23.0%) because this is the land of hundreds of years of temples and shrines and is also the land of the sacred, so most tourists appreciate Hue; Perception of spiritual tourism Bad/ Simple has 1 person (accounting for 1.0%); And There are other impressions There are 2 people (accounting for 2.0%).

#### **4.3.4 Visitors' opinions on natural scenic spots**

**Table 7. Visitors' ratings of scenery in Hue**

Scenery	Quantity (People)	Ratio (%)
Huong river	41	41.0
Truong Tien Bridge	40	40.0
Thien An Hill	7	7.0
Vong Canh Hill	10	10.0
Other scenery	2	2.0
Total	100	100.0

*Source: Investigation and data processing in 2022*

#### The most impressive landscape

Among the 100 tourists surveyed, 41 tourists were impressed by the Perfume River (accounting for 41.0%), and the Truong Tien Bridge had 40 people (accounting for 40.0%) because these two images always go together, coming to Hue. both see these two images so it is very familiar to locals and tourists alike. Thien An Hill has 7 people (accounting for 7.0%), Vong Canh Hill has 10 people (accounting for 10.0%) because these two landscapes were previously very little known, little interested and it is not a special image. Only when the films filmed here appear on the screen, will customers know about the cool and peaceful natural scenery. Since then, many people know about these two landscapes, especially young people. And other scenery with 2 people (accounting for 2.0%).

**4.3.5 Visitors’ opinions on Hue City’s cuisine**

**Table 8. Visitors’ opinions on food**

Cuisine	Quantity (People)	Ratio (%)
Tasty	45	45.0
Diversity, richness	53	53.0
Not my favorite	0	0.0
Other...	2	2.0
Total	100	100.0

Source: Investigation and data processing in 2022

*Visitors’ opinions on Hue cuisine*

Among the 100 tourists surveyed, 45 tourists commented on the delicious Hue cuisine (accounting for 45.0%) because the characteristics of Hue dishes are bold and very spicy; 53 visitors commented that Hue cuisine is diverse and rich (accounting for 53.0%) because it is said that Hue has 1001 dishes; No one commented that Hue cuisine did not suit the taste (accounting for 0.0%); And 2 people have other comments about Hue cuisine (accounting for 2.0%). Most of the tourists have a very good impression of the food in Hue, this is very important in forming a good feeling about Hue, because to any destination, we have to stop. You can enjoy the cuisine in that place to see how it is different from where you live and especially how much it is different from the same dish but processed elsewhere.

**4.3.6. Visitors’ evaluation of tourism services**

**Table 9. Visitors’ opinions on services at the destination**

Service at the destination	Quantity (People)	Ratio (%)
Satisfied	76	76.0
Normal	23	23.0
Unsatisfied	1	1.0
Other...	0	0.0
Total	100	100.0

Source: Investigation and data processing in 2022

*Review of services in Hue*

Among the 100 tourists surveyed, 76 tourists are satisfied with services in Hue (accounting for 76.0%); Thank you Teacher Normally there are 23 people (accounting for 23.0%); Dissatisfied with 1 person (accounting for 1.0%); And No one feels Other (accounting for 0.0%).

*Tourists love to take a cruise and listen to Hue songs on the Perfume River*

Among the 100 surveyed tourists, 76 tourists like to go on a cruise and listen to Hue songs on the Perfume River (accounting for 76.0%), Hue songs usually take place at night and mainly sing Hue folk songs. which is not available in other places, so every tourist coming to Hue wants to once sit on a boat along the Perfume River and listen to Hue songs in the evening, in the summer it is very cool and suitable for this; There are 19 people who don’t like to go on a cruise and listen to Hue songs on the Perfume River (accounting for 19.0%).



**Table 10. Visitors' opinions on cruising and listening to Hue traditional songs**

<b>Boat service and listening to Hue songs</b>	<b>Quantity (People)</b>	<b>Ratio (%)</b>
Used	76	76.0
Not used	19	19.0
Other	5	5.0
Total	100	100.0

Source: Investigation and data processing in 2022

#### 4.3.7. Visitors' opinions on local people

**Table 11. Visitors' perceptions of local people**

<b>Visitors' opinions on local people</b>	<b>Quantity (People)</b>	<b>Ratio (%)</b>
Friendly	76	76.0
Unapproachable	1	1.0
Sociable	22	22.0
Other...	1	1.0
Total	100	100.0

Source: Investigation and data processing in 2022

#### *Visitors' opinions on local people*

Among the 100 tourists surveyed, there are: The group of tourists who perceive the people as friendly has 76 people (accounting for 76.0%); Hard to get close to 1 person (accounting for 1.0%); Sociability has 22 people (accounting for 22.0%); And 1 person has a different feeling (accounting for 1.0%). Visitors to Hue have a good feeling about the people here, this is also an important factor in helping visitors have a good feeling about the destination. Tour guides, vendors, and service providers are all residents living here, so they are the ones in direct contact with tourists, so their attitude also greatly affects the decision to visit. their prices. When a resident has a rude attitude or disrespects them, they definitely have a bad view of the destination. And fortunately, people in Hue are not like that, they are always friendly and enthusiastic with everyone, especially people from other places,

#### 4.3.8. Overall rating of tourists about tourism destination of Hue City

*Overall rating of visitors about the worth to visit and experience of Hue's tourist destinations.*

Among the 100 tourists surveyed, 82 tourists rate Hue as a place worth visiting and experiencing (accounting for 82.0%) because Hue is a land of historical relics, but already a historical relic, there are many omens. interesting things that we don't know about, only when we visit and experience can we understand and see those things, but through newspapers and pictures, we can't feel them all; 1 person rated Hue not worth visiting and experiencing (accounting for 1.0%); 17 people hesitated (accounting for 17.0%); And no one has other reviews (accounting for 0.0%).

**Table 12. Visitors' overall opinions about the destination**

<b>Overall rating of visitors</b>	<b>Quantity (People)</b>	<b>Ratio (%)</b>
Satisfied	96	96.0
Wondering	2	2.0
Not satisfied	2	2.0
Other	0	0.0
Total	100	100.0

Source: Investigation and data processing in 2022

## 5. CONCLUSION

The study of destination image and its measurement is characterized by diversity and complexity. The attributes utilized to measure destination image vary depending on the study's goals, scope, and focus. In the case of Hue City, several prominent aspects of the destination's image have been evaluated, encompassing tourists' perceptions and rational assessments. These aspects include the scenic beauty of the city, its culinary offerings, the presence of Hue music, the cleanliness of the tourist environment, the safety of the local traffic, and the warm and welcoming demeanor of the local population. While the majority of tourists hold positive evaluations of Hue as a destination and express a willingness to return if certain shortcomings are addressed, it is important to acknowledge the existence of negative opinions that some visitors may hold, as they compare Hue to other destinations they have experienced.

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## READING CULTURE OF STUDENTS AT THE UNIVERSITY OF ECONOMICS, HUE UNIVERSITY

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**ABSTRACT:** *This exploratory study examines the current reading status of students at the University of Economics, Hue University and identifies the factors influencing their reading habits. A survey was conducted among 200 students, and exploratory factor analysis was utilized to uncover the underlying factors behind students' reading preferences. The results indicate that two primary groups of factors, namely individual and technological factors, as well as reading environment and school support, significantly impact students' reading status. The findings suggest the need for interventions to encourage reading habits and provide school-based support for reading activities. Implementing these solutions can help cultivate a reading culture among students and enhance their interest in reading.*

**Keywords:** *reading culture; influencing factors; Student; Hue University.*

### 1. INTRODUCTION

Books are regarded as valuable repositories of human knowledge, offering numerous advantages to individuals. Specifically, they serve as an extensive knowledge base for students, enabling them to engage in reading, access resources, acquire knowledge, study, and prepare for examinations. However, the present reality indicates a significant decline in the number of students who devote their leisure time to reading books, or who have read books but have not achieved satisfactory outcomes.

In recent years, the rapid advancement of information technology has resulted in a gradual detachment from the practice of reading books, and students are not exempt from this trend. A growing number of students at the University of Economics, Hue University (HCE) have progressively forsaken books and lost touch with the reading culture. The reduced inclination towards reading among students leads to a dearth of knowledge, a deficiency in qualifications, a failure to cultivate creative thinking abilities, and a lack of essential skills. Consequently, it becomes imperative and meaningful to evaluate the reading situation and identify the factors that influence students' reading habits at the University of Economics in order to foster the formation of a reading culture.

Considering the aforementioned concerns, it becomes necessary to conduct a more comprehensive study on the reading patterns of students at HCE and the university as a whole. Such an investigation would enable us to identify the factors that impact students' reading behavior within the academic institution. Subsequently, viable solutions can be proposed to encourage students to engage in book reading and cultivate an effective reading habit.

### 2. THEORETICAL BASIS AND RESEARCH METHODS

#### 2.1. Study overview

Reading has become a universal concern transcending national boundaries, as it continues to captivate the attention and interest of society. Particularly in the contemporary era characterized by the proliferation of information and advancements in science and technology, the culture of reading has evolved beyond conventional methods to encompass modern formats facilitated by electronic devices such as smartphones

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<sup>1</sup> University of Economics, Hue University

and computers. The advent of the Internet has provided accessibility to an array of reading materials, catering to the preferences of younger generations. However, the rapid growth of mass media and popular social platforms like Facebook and TikTok has led to the perception that reading books has diminished in significance, with waning public interest. Consequently, the matter of reading books and the necessity of cultivating reading habits remains enduring concern warranting widespread attention.

The study conducted by Luu Thuy Duong (2009) focuses on investigating the reading and purchasing requirements of students in Hanoi. The research aims to comprehensively assess the present scenario, identify underlying causes and development trends, and propose suitable strategies and solutions to enhance the demand for books among students in the capital city of Hanoi. The aforementioned study conducted by Vu Thi Thu Ha (2013) delves into the reading culture in Vietnam within the framework of integration and development. This research provides insights into the prevailing reading patterns among the Vietnamese populace. Notably, the findings reveal a tendency among readers to conform to group psychology, align with market demands, succumb to public relations strategies employed by publishing entities, and exhibit a preference for “forbidden” books as a means of satiating curiosity and seeking entertainment, rather than engaging in reading for the purpose of knowledge cultivation.

Based on the findings presented in the research article titled “Developing Reading Culture for Students of Dong Thap University” by Nguyen Thi Nhu Quyen (2020), it is evident that the cultivation of a reading culture within the educational setting plays a crucial role in the holistic formation and progression of students. This reading culture not only enhances students’ research and self-study abilities, but also facilitates their capacity for critical analysis, constructive evaluation, positive thinking, and overall cognitive development. Consequently, it becomes evident that reading culture significantly contributes to the enhancement of educational quality and training efficacy within academic institutions.

Furthermore, a study conducted by Nguyen Thuy Quynh Loan and Vo Hoang Duy (2013) titled “Factors Affecting Students’ Reading Habits of Specialized Books: A Case Study at Ho Chi Minh City University of Science and Technology” proposes a comprehensive model that elucidates eight key factors influencing students’ reading habits of specialized books. These factors encompass the roles of lecturers, students themselves, the home environment, the classroom environment, the school environment, the social environment, the virtual world, and the characteristics of the reading materials.

Collectively, these findings underscore the significance of shifting societal perceptions towards reading culture, particularly among students. Cultivating a purposeful and structured reading habit emerges as an imperative pathway towards effective learning and the establishment of a solid foundation for future personal development.

## **2.2. Theoretical basis**

### ***What are books and reading books?***

The advent of books is intricately intertwined with the progression of human writing and language. Initially, they manifested as rudimentary inscriptions etched upon wood and stone, eventually evolving into the written texts on paper that are commonly published as books today. The concept of books varies among individuals, prompting inquiries into their true essence. The understanding of books is subjective, and each person may harbor a distinct conceptualization, shaped by their personal needs, interpretations, and the functions fulfilled by books. This subjective lens serves as the pivotal factor in the process of defining books from an individual standpoint. In accordance with Bui Tuan An’s work, “What is a Book? What are the benefits, roles, and meanings of reading habits?” (2022), the following insights can be discerned:• Books are intellectual products of people, accumulated through practical knowledge, cultures and histories of peoples in the world. These literary works serve as profound instruments for showcasing the accomplishments of

humanity during their inception and evolution. • Books are invaluable assets containing all knowledge, life experiences and human emotions. It is a spiritual food, brings relaxation, inspires readers, and is a solid luggage leading to the path of human success. Books are the most important way to provide knowledge to people in all fields such as life, economy, culture, society...

Reading is the way to approach and deepen the knowledge that the author conveys in the book. Must know how to read reasonably and usefully, in accordance with the law of access to knowledge.

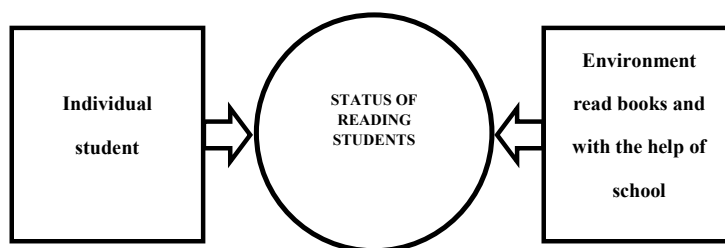
Reading makes a great contribution to fostering and cultivating knowledge and skills in life, helping to form and perfect human personality.

### *Meaning of reading*

The act of reading contributes significantly to the acquisition of knowledge among individuals, thereby fostering an augmentation of one's lexicon and overall understanding. Moreover, the pursuit of reading facilitates the assimilation of a vast repertoire of human wisdom, leading to the expansion and broadening of one's intellectual horizons. Additionally, cultivating a habit of reading engenders the development of focused attention and serves as a means of alleviating psychological strain, ultimately mitigating the burden of stress.

### **2.3. Research models**

Based on the research model of Nguyen Thuy Quynh Loan & Vo Hoang Duy (2013) group proposed two main groups of factors that are individual students affecting the reading status of students.



*Source: Proposal of the research team*

### **2.4. Research Methods**

#### *Methods of data collection and processing*

- Secondary data: The secondary data for this study will be sourced from pertinent scientific research topics, articles, and journals that specifically address the subjects of books and reading.

- Primary data: The primary data will be gathered through a convenient sampling technique from a sample of 200 students representing various faculties within the University. The data collection will be conducted via an online survey utilizing questionnaires designed for this purpose. The survey participants will consist exclusively of University students. The collected data will be used to generate conclusions that can be applied to the broader population under investigation.

Subsequently, the acquired questionnaire data will undergo coding, data entry, cleaning, and processing procedures. Excel and SPSS software systems will be employed as analytical tools for the data analysis..

#### *Data Analysis Methods*

Qualitative methods are used to analyze and synthesize the factors affecting the reading status of students of HCE..

The research team used a survey with a 5-point Likert scale: “Strongly disagree - Disagree - Neutral - Agree - Totally agree” to survey the factors affecting the practice. Reading status of students of the University of Economics, University of Science and Technology.

**Table 1. Structure of students participating in the survey**

		Quantity	Ratio (%)
<b>Sex</b>	Male	eighty seven	43.5
	Female	113	56.5
<b>Course</b>	K55	52	26
	K54	75	37.5
	K53	45	22.5
	K52	28	14
	Other	0	0
<b>Department</b>	Economics development	44	22
	Business administration	52	26
	Financial accounting	48	24
	Political Economy	32	16
	Economic information System	24	twelfth
<b>Reading level</b>	Daily	39	19.5
	5 days/week	72	36
	3 days/week	68	34
	1 day/week	18	9
	Other	3	1.5
<b>Read library books</b>	Frequently	74	37
	Never	126	63

**Table 2. Cronbach's Alpha coefficient after removing variables**

Factor	Codename	Total variable correlation	Cronbach's Alpha coefficient	Alpha
Individual students	CNSV			
Students are still not aware of the importance of reading	CNSV1	0.601	0.808	0.833
Students often choose books to read based on personal preferences	CNSV2	0.519	0.819	
Students only read books that are relevant to their major	CNSV3	-	-	
Students only read books, documents, and textbooks when assigned by the instructor	CNSV4	-	-	
Students' financial resources are limited, so the choice of reading books is limited	CNSV5	0.385	0.834	
Reading more or less depends on students' habits	CNSV6	0.616	0.807	
Students find reading boring and unattractive	CNSV7	0.459	0.828	
Students today often read books and electronic documents more than reading books and paper documents	CNSV8	0.692	0.798	
Students today read books nonchalantly, not brooding	CNSV9	0.539	0.817	
Incorrect reading method of students leads to ineffective reading	CNSV10	0.689	0.796	
Reading environment and school support	MTDS			
Ambient environment can affect reading efficiency	MTDS1	0.411	0.982	0.816
Students can actively build a reading environment suitable for themselves	MTDS2	0.807	0.598	
The school builds a healthy reading environment for students right at the school's library	MTDS3	0.839	0.558	
The school regularly organizes "Reading Day" for students	MTDS4	-	-	
The school organizes talkshows about books with the participation of speakers to make students more interested in reading.	MTDS5	-	-	

**Table 3. Total variance extracted factors**

Factor	Initial characteristic values			Total variance extracted		
	total	% variance	Accumulation frequency (%)	total	% variance	Accumulation frequency (%)
first	5.070	46,090	46,090	5.070	46,090	46,090
2	1.139	10.353	56,443	1.139	10.353	56,443
3	1.051	9.552	65,995	1.051	9.552	65,995
4	0.821	7.459	73.454			
5	0.679	6.175	79,629			
6	0.575	5.228	84,857			
7	0.489	4.444	89,301			
8	0.454	4.124	93.425			
9	0.369	3.351	96.776			
ten	0.321	2.920	99,696			
11	0.033	0.304	100,000 won			
KMO . value				0.848		
AccreditationBartlett	Chi-square test			1239,777		
	Significance level (Sig.)			0.000		

### 3. RESEARCH RESULTS

#### 3.1. Descriptive statistics

After surveying 200 students at HCE, University of Economics, a total of 200 valid results were obtained (Table 1).

*Sex:* Of the 200 surveyed students, 113 students are female (accounting for 56.5%) and 87 students are male (accounting for 43.5%).

*Course:* There are 28 students in Course 52 (accounting for 14%), 45 students in Course 53 (accounting for 22.5%), 75 students in Course 54 (accounting for 37.5%) and 52 students in Class 55 (accounting for 26%).

*Department:* After surveying 200 students from 5 faculties of the university, the Faculty of Economics & Development has 44 students (accounting for 22%), the Faculty of Business Administration has 52 students (accounting for 26%), the Faculty of Accounting and Finance has 48 students (accounting for 24%), the Faculty of Political Economy has 32 students (16%) and the Faculty of Economic Information Systems has 24 students (accounting for 12%).

#### *Reading level by gender:*

Among the cohort of 87 male students who were surveyed, the predominant frequency of reading among them was determined to be 3 days per week, which constituted the highest proportion of male students at 43.68% (n=38). Additionally, 34.48% (n=30) of male students reported reading on a daily basis, while a mere 9.2% (n=8) engaged in daily reading. Furthermore, 11.49% (n=10) of male students indicated a reading frequency of once a week, whereas a minimal 1.15% (n=1) claimed to read at other intervals. The aforementioned data substantiates the assertion that the leisure-time reading habits of male students remain considerably inadequate. Among the 113 female students surveyed, female students regularly read books in their free time more often than male students often read books. In which, the level of reading books 5 days/week accounted for the highest rate of 37.17% (42 students); the daily level accounted for 27.43% (31 students); the level of 3 days/week accounted for 26.55% (30 students); reading level 1 day/week accounted for 7.08% (8 students) and other level accounted for only 1.77% (2 students).

*Level of reading in the school library:* Out of 200 students participating in the survey, 74 students (37%) have used and read books at the school's library. The remaining 126 students (63%) still have never accessed and used the university's library.

**3.2. Evaluation of the reliability of the scale by Cronbach's Alpha coefficient**

After analyzing Cronbach's Alpha (Table 2), there are 4 variables CNSV3, CNSV4, MTDS4 and MTDS5 with the total correlation coefficient less than 0.3, so they should be removed. The remaining variables all have a total correlation coefficient greater than 0.3 and after conducting the final re-test, they are kept due to ensuring the reliability of the scale.

**3.3. Exploratory factor analysis EFA for independent variables**

From the test results of Table 3, it shows that the value of KMO coefficient reaches  $0.848 > 0.5$ . This proves that this value is suitable and qualified for factor analysis. Bartlett's test results reached 1239,777 with the Sig significance level.  $= 0.000 < 0.05$  shows that there is a correlation between the variables included in the research model. Therefore, survey data used to conduct exploratory factor analysis EFA is appropriate.

The analysis results show that with 11 analyzed variables, there are 3 factors with Eigenvalues greater than 1, these three factors show the best data characteristics compared to extracting the remaining factors later. . And with the total variance extracted is  $65.995\% > 50\%$ . That is, these three groups of factors explain 65.995% of the variation of 11 observed variables. Thus, the conditions of analysis and factor formation are appropriate and no additional observed variables must be removed.

**Table 4. Statistical table describing the average factor "Individual student" and "Reading environment"**

Factor	N	Smallest value	The greatest value	The average value	Standard deviation
Individual students					
CNSV1	200	first	5	4.07	0.900
CNSV2	200	first	5	4.13	0.800
CNSV3	200	first	5	3.28	1.091
CNSV4	200	first	5	3.11	1.019
CNSV5	200	first	5	4.09	0.714
CNSV6	200	first	5	4.41	0.785
CNSV7	200	first	5	4.00	0.894
CNSV8	200	2	5	4.40	0.763
CNSV9	200	first	5	4.10	0.860
CNSV10	200	first	5	4.34	0.853
Reading environment					
MTDS1	200	2	5	4.43	0.668
MTDS2	200	first	5	4.33	0.687
MTDS3	200	first	5	4.36	0.695
MTDS4	200	first	4	2.32	0.966
MTDS5	200	2	5	3.68	1,049

After running descriptive statistics on the average value for two factors "Individual student" and "Reading environment", based on the calculation of the distance value, the results of Table 4 show that:

For the factor "Individual student" there are 2 variables "CNSV3" and "CNSV4" with mean values approximately equal to 3, showing that students are still neutral with 2 opinions "Students only read suitable books". Relevant to the major they are studying" and "Students only read books, documents, and textbooks when assigned by the lecturer". The remaining 8 variables all have an average value of approximately 4, showing that



students tend to agree with these 8 ideas. In general, this result shows that the school's students tend to agree with the ideas set out in the "Individual student" factor that has a great impact on the student's reading situation.

Besides the external environment, the scholastic reading environment garners considerable interest among students. After running the average descriptive statistics for the factor "Reading environment", we can see that the variable "MTDS4" has an average value of approximately 2, which shows that students disagree. Note that "The school regularly organizes "Reading Day" for students. The remaining 4 variables "MTDS1", "MTDS2", "MTDS3" and "MTDS5" have an average value of approximately 4, indicating that students tend to agree with these ideas. Through this result, it is shown that the factor "Reading environment" also greatly affects the reading status of students with a high degree of student agreement. Additionally, it should be noted that the school's current provision of playgrounds and reading contests for students is limited. Consequently, a significant number of students express discontentment with this inadequacy. Consequently, it is imperative for the school administration to allocate greater consideration towards the literacy engagement of students within the institution. Specifically, the implementation of a diverse range of playgrounds and the organization of captivating and educational reading events are essential for fostering a heightened enthusiasm for reading among students. By establishing an environment conducive to healthy reading practices, students will be encouraged to extensively engage with literary materials.

#### 4. CONCLUSIONS AND RECOMMENDATIONS

Drawing upon theoretical frameworks and empirical inquiries, this research undertakes a comprehensive examination utilizing both quantitative and qualitative methodologies to appraise the multifaceted determinants that shape the reading proclivities of students enrolled at the University of Economics and Business, along with the University of Science and Technology. The principal objective is to assess the present reading landscape among students and proffer strategies to promote augmented engagement with literary materials, thereby augmenting the overall caliber of their reading endeavors. The research findings unveil the presence of two discrete classifications of factors that exert influence upon the reading habits of students at both academic institutions: individual student factors and factors encompassing the reading milieu and institutional support. By analyzing the outcomes derived from surveying a sample of 200 students from the University of Economics and Business, several recommendations have been formulated by the research team to encourage greater book reading, cultivate positive reading habits, and generate a heightened interest in reading among students at the aforementioned universities. These proposed solutions are as follows:

*Group of solutions to encourage students to read books:*

Reading more or less books, or how to read books to get the best effect depends largely on each individual student. In order to make reading highly effective and improve reading habits for students of HCE, University of Technology, some solutions are proposed for each individual student as follows:

*Firsly*, students should start reading books with topics that they find interesting. It is advisable to start reading a little, then gradually increase the time and frequency of reading.

*Secondly*, students can identify the great purpose of reading the book that they aim for. It will be a great motivation to help students improve their reading spirit and accumulate lessons learnt from reading books.

*Thirdly*, students actively seek and build a reading environment suitable for them. Organizing time and plan, reading goals are reasonable, and students must be persistent in reading to create a habit of reading regularly.

*Fourthly*, students should choose a quiet reading environment and space, and they should read books in the "golden" time frame to increase the ability to concentrate and increase the ability to absorb the content contained in the book, from which the reading efficiency is also improved.

*Fifthly, students* should filter, note down the main and important contents, in each book so that they could learn more deeply about the content and increase their ability to remember.

*Sixthly, students* should go to the library regularly to be able to search and read more genres of books, thereby improving their understanding and improving their thinking ability to serve their study as well as apply it in their daily life.

*Seventhly, students may* often exchange and share reading with friends and teachers so that they can learn from each other through debating and answering questions about the issues, contents, and implications of each book. From there, it helps students increase their ability to understand, as well as improve critical thinking of each individual.

*Eighthly* they should reduce their time spent hanging out and surfing social media, using the Internet. They should instead use their free time for reading more books. Because, only when they have knowledge they really succeed, but that knowledge they all learn from books.

*Group of solutions to support students reading:*

In addition to the imperative for students to uphold a daily reading regimen, the cultivation of a reading culture within the school holds significant importance. Several strategies have been proposed to facilitate and foster increased book consumption among students in the HCE. Firstly, regular organization of conferences, seminars, and book fairs would serve to captivate and motivate students to engage in extensive reading. Secondly, the implementation of book contests would afford students the opportunity to showcase their comprehension of literary works and the knowledge acquired through reading. Thirdly, a promotional plan for the school library ought to be devised, aimed at enhancing students' awareness of its presence. Furthermore, student feedback concerning the library should be actively solicited, enabling iterative improvements and the establishment of an optimal reading environment within the school's library. Fourthly, the school should strive to develop and enhance its digital library system, incorporating user-friendly functionalities and an intuitive interface that facilitates expedient document retrieval and borrowing via mobile devices or computers. Additionally, the digital library system of HCE could be integrated with the digital library systems of universities within Hue University or the community library. Such integration would broaden the available resources and more effectively cater to the academic pursuits and research endeavors of students.

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